OVERSEAS EDITION
APRIL 1955

McGRAW-HILL DIGEST

INTERNATIONAL BUSINESS AND INDUSTRY

RESEARCH today can insure your company's future. You can be sure that your markets will change. Is your company ready to change with them?.....p13

QUALITY CONTROL on your plant's output can cut your costs drastically. The trick lies in proper application.....p16

BUILDING CONSTRUCTION trends — in technique and materials — hold the close attention of contractors in a steadily growing industry.....p20

FINANCIAL DIGEST, a new feature starting in this issue, analyses the trends and underlying factors in the world of finance.....p37

ELECTRONIC CONTROL, from gyropilots to lathe operation, is assuming a major role in industries of all types.....p38

PERSONAL DIGEST, another new feature, is designed to help executives in their personal planning.....p44

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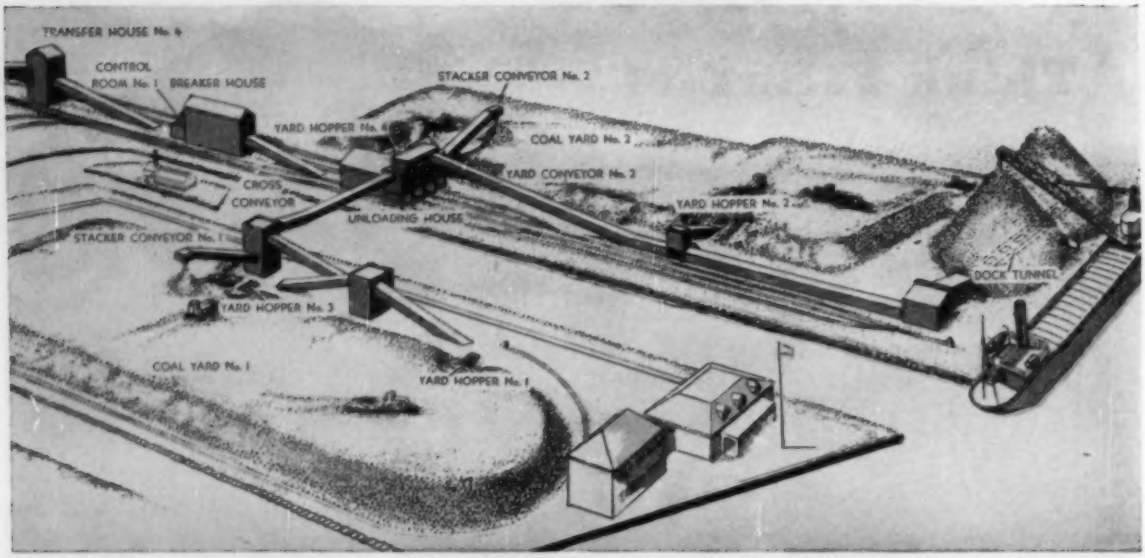
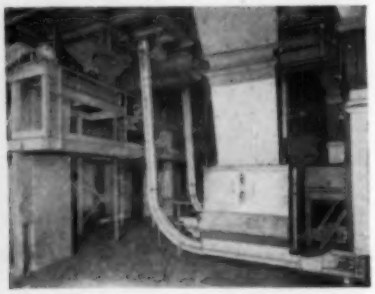


Under coal dock, Link-Belt reclaim conveyor is fed by eight belt feeders.

Belt conveyor delivers to reversible shuttle feeder over low-pressure plant bunkers.



Two Bulk-Flo conveyor-elevators deliver coal to crushers for continuous sampling.

Link-Belt system directs 2000 tons of coal an hour with

push-button conveyor automation

ONE reason why America's power companies can provide homes and business with low-cost electricity is the efficiency with which they handle coal. The case of Detroit-Edison's addition to their Conners Creek station illustrates the automation possible.

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1. Receive approximately 1.3 million tons of coal a year by boat and rail.
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3. Store coal in two separate yards, reclaim coal from these yards or feed directly to power plants.
4. Maintain centralized control of electrically interlocked system.
5. Provide continuous, automatic weighing and sampling.
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. . . the best from 45 business magazines—see p56

Business	Research and Your Future	13
	Diversify for Safety	23
	Truckers in 14 Nations	40
Construction	Building Construction Trends	20
	Aluminum Tunnel Forms	26
	New for Kitchens: Packaged Components	29
	Interlocking Forms Save Builder Time	30
	Line Marks Road Edge, Cuts Accidents	32
Engineering	Tests Titanium Alloy for Aircraft	22
	Radiation Sterilization of Food and Drugs	24
	Torsion-Bar Eliminates Car Springs	26
	Standard Sizes for Oil and Grease Containers	29
	Tomorrow's Truck Today	34
	Electronics Place in Control	38
	Flat Television Tube Could Alter Industry	45
Management Methods	Talk Your Work Away	15
	Quality Control by Samples	16
	Foreman's Biggest Job	22
	Policies Build Business	28
	Dispenses Uniforms	35
	Plan Trains Executives for Future	40
	Work-Sampling Method Improves Safety	42
	Promotes Safety	44
Materials	Cheap Paint May Cost More	18
	Heavy Aluminum Coating	24
	Glass for Tomorrow	26
	Cuts Banana Loss	26
	New Chemicals Offered	32
	Radioactive Material Finds Leaks	35
	New Trends in Metals	46
Production	Carbide Shims Aid Tools	18
	Automatic Control Cuts Acid Cost	28
	Phosphate Process Produces Fertilizer	30
	Heat for Industry	36
	Chemical Synthesis	41
	New Manganese Process	44
	Vacuum Forming Large Plastic Parts	45

Departments	U.S. Business Trends 7	Financial Digest	37
	International Trends 9	Personal Digest	44
	New Ideas Tell How To 19	Management Report	53
	Technical Ideas 34	New Products	48

New Free Catalogs... 54

April, 1955 — McGRAW-HILL DIGEST — Vol. 10—No. 4

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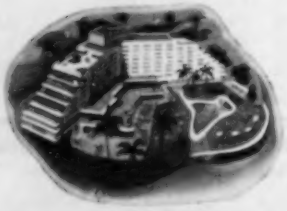

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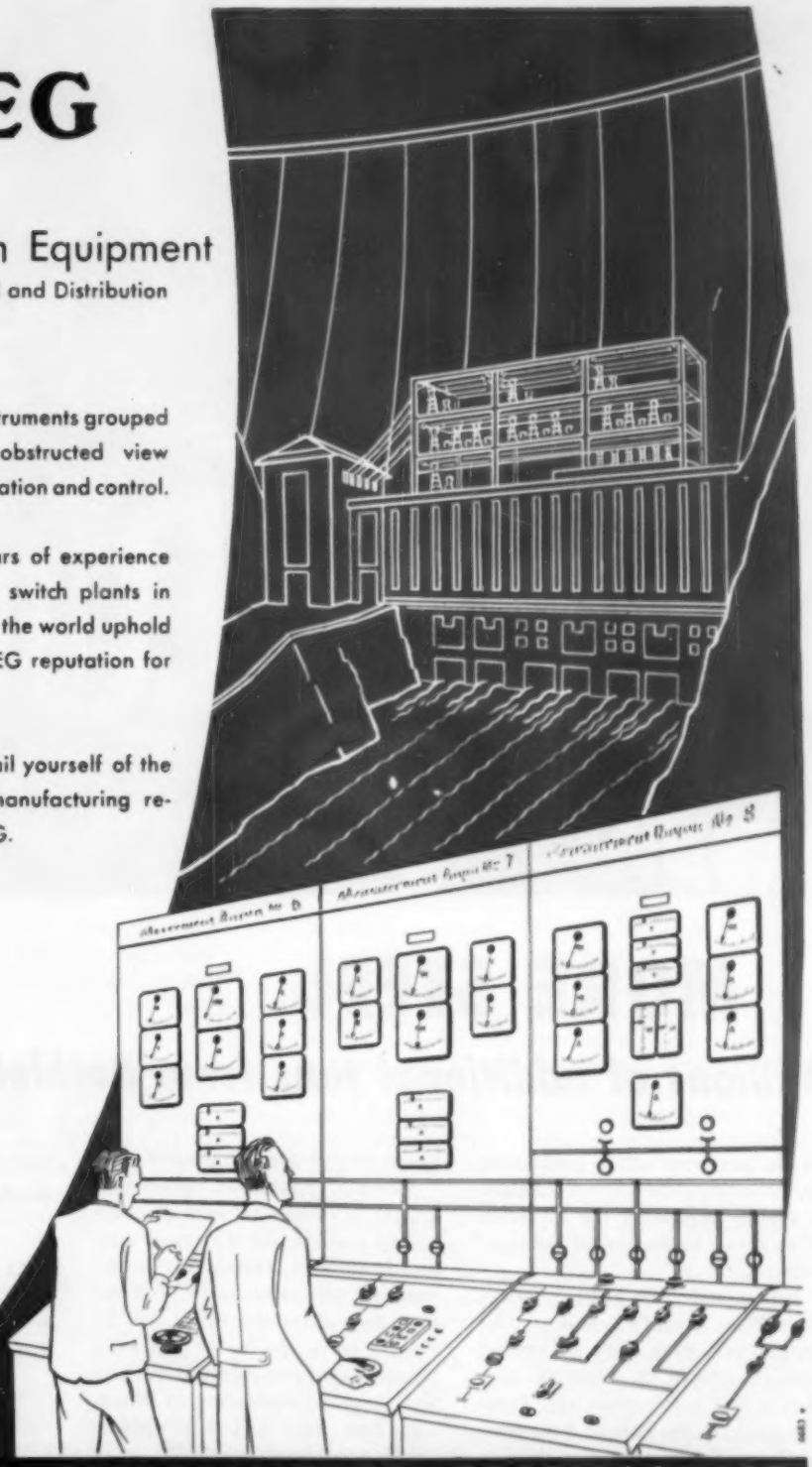

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704E

U.S. BUSINESS TRENDS

HOW BIG A COMPANY . . .

. . . can be and should be is being argued more and more as the U. S. economy continues to grow.

Economists have traditionally assumed that there was an economic limit to the growth of an operation; that sooner or later a company ran into the law of diminishing returns. It would begin to appear now, however, that the economists overlooked an important factor: diversification.

Edith Penrose of Johns Hopkins University has offered a newer theory of corporate growth. Economically, she says, there is no limit on growth. As long as a company keeps branching out it can theoretically keep on growing.

What does control size? Management, says Mrs. Penrose. Lack of management organization is the big stumbling block to continued growth. This, however, is being overcome by decentralization. By splitting a corporation into its logical parts, either by product lines, by geography or by markets, modern management is overcoming the complexities of bigness.

In one sense, this still leaves the classic theory of economic growth intact. It can be argued that the highly diversified firm is no longer a single enterprise from the standpoint of pure economics.

BUSINESS SUPPORT TO EDUCATION . . .

. . . will increase. Major U.S. companies are acutely aware of their own long-term need for highly trained personnel. They are also aware that most colleges and universities are faced with financial problems.

Not only are maintenance and operating expenses higher than ever before, there is also the continuing problem of attracting qualified professors. Men with the necessary background to teach are often lured away by the higher pay of industry, and the appeal of the academic life alone is no longer sufficient incentive to draw top men.

There has been surprisingly little resistance from stockholders—whose dividends reflect corporate grants to education—probably because they recognize that the problem is, for all practical purposes, inevitable.

The alternatives: business gives direct aid to higher education or the government does. Either way, business pays in the long run—directly or through taxes.

Direct aid at least permits a company to place its funds where it wishes and to reap the benefits more directly. The theory is that graduates give first consideration to the companies that have helped support their college.

IF YOU SELL CAPITAL EQUIPMENT . . .

. . . don't discount the possibility of a price war. Serious price-cutting is, of course, more prevalent in consumer goods, but even the normally-stable heavy-electrical-equipment industry recently went through a major shake-up.

No one knows even now exactly how or where the trouble started. Manufacturers hint darkly that "competitors" started to cut prices drastically. Everybody claims that he went along with a competitive situation. But if nobody knows who started the price cuts, everybody knows who benefited: the utilities companies.

Utility engineers normally figure their buying on a tight year-to-year schedule. But when the market for heavy electrical equipment started to soften, they made a fast estimate of needs through 1957 and started to hunt for bargains.

The result: some sources estimate that equipment buyers saved a total of $200-million.

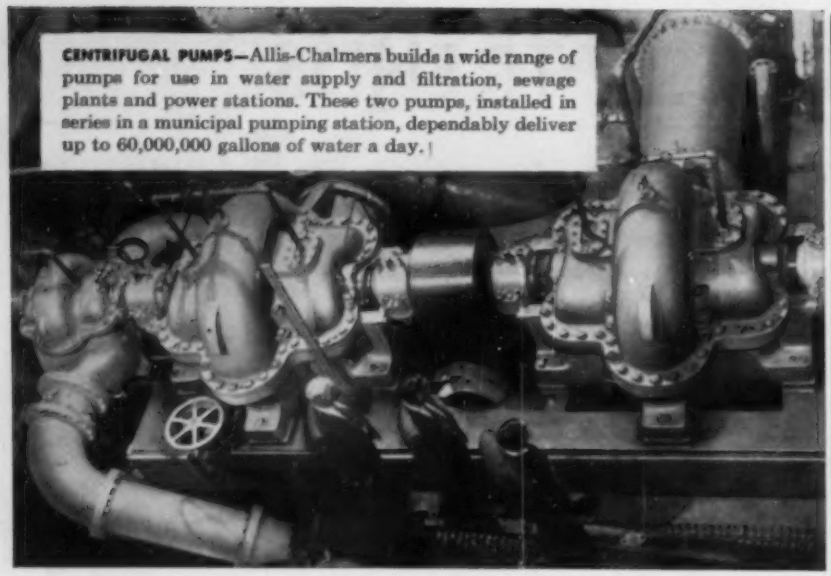
EXECUTIVE BASE SALARIES GROW . . .

. . . but their rate of growth is not keeping up with corporate profits, factory workers' wages or personal income taxes. Fringe benefits are, however, making up the difference. These include stock options, pensions, insurance plans and profit-sharing arrangements.

A recent survey by the American Management Association indicates that from 1952 to 1953, straight salaries rose only 4.2%. But bonuses went up 6.8%. Total compensation between 1948 and 1953 increased an estimated 23.5%. In the same 5-year period, the average factory worker's wages increased 30% and sales in the companies these executives served rose 60%.

Executive compensation is important not only to management men, but also to stockholders and employees. Competition for managerial talent is intense among top companies, and the best of firms can be severly hampered by a failure to provide sufficient incentive to its policy makers.

The importance of fringe benefits will relate directly to the level of personal income taxes in coming years. Take for example the company president who makes $125,000 per year. An increase of $50,000 would mean a net increase after taxes of only $4,700. Obviously, a man in this position is better off with some form of deferred compensation in the form of a pension or stock option.



CENTRIFUGAL PUMPS—Allis-Chalmers builds a wide range of pumps for use in water supply and filtration, sewage plants and power stations. These two pumps, installed in series in a municipal pumping station, dependably deliver up to 60,000,000 gallons of water a day.

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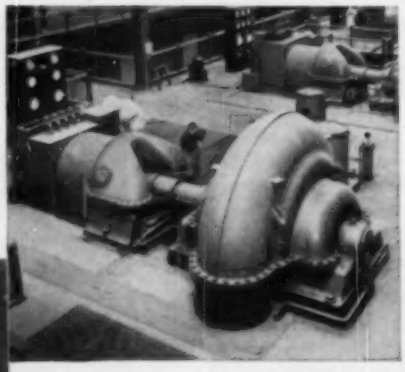
For more than 50 years, Allis-Chalmers has been a leading supplier to public works projects all over the world. Here are examples of modern A-C equipment and how it works for the public's benefit.

BLOWERS, TURBINES, CONDENSERS—This modern municipal plant converts sewage into fertilizer which is sold commercially. The blowers (among the world's largest for this type of operation) plus the turbines and condensers were built by Allis-Chalmers.



SYNCHRONOUS MOTORS—For dependable, low maintenance operation, this pumping station relies on three sets of Allis-Chalmers motors and pumps. Each of the synchronous-type motors delivers 4,300 horsepower.

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INTERNATIONAL TRENDS

PARIS—

Economists and business leaders in Western Europe are becoming increasingly concerned with marked inflationary tendencies which are starting to be apparent on the continent.

You can expect several governments to take fiscal measures to meet the trend. Britain's effort to meet the issue head-on by increasing the Bank of England discount rate—thereby tightening the terms on which the Bank will lend funds to the capital market—was the first of the major moves.

Generally speaking, European incomes have outgrown production, and the problem today is one of too much money and too little goods.

You can measure the trend by these factors: increasing labor shortages, further increases in wages, heavier imports to fill consumer demand, and further deterioration of Europe's foreign-payments position.

WASHINGTON—

Protectionist pressure against President Eisenhower's foreign economic program is stronger than anticipated. But official and private observers still think he will get most of what he wants. Here is the outlook for major parts of the program.

The 3-year trade agreements bill giving the President new tariff-cutting powers is having an easier time in the Senate than it had in the House. Senators are less influenced than Representatives by individual industries seeking protection from imports. The bill will pass. But the chance of restrictive amendments is greater since they can be offered from the floor as well as in committee. The most likely amendment: A tougher "escape clause" to make it easier for domestic industries threatened by imports to get tariff increases.

The revised General Agreement on Tariff and Trade (GATT) is having a rough passage through Congress. The opposition comes from constitutional purists who claim that GATT delegates sovereignty to an international organization in violation of the Constitution, not from domestic industries afraid of foreign competition.

That means the big fight will be in the Senate. It can go either way. Killing GATT would kill the reciprocal trade program—that is unlikely. Postponing a decision would put off tariff negotiations for 2 years. That is a real possibility.

Customs simplification should go through unless it gets caught behind other legislation. The administration wants to change the basis for evaluating customs duties to the export value from the foreign value. That would cut delays, red tape, uncertainty, and litigation for importers almost in half.

Economic aid for Asia will be increased by Congress. The administration is asking for $400-million more than last year. Actual spending will go up less than $100-million in fiscal 1956 though. Most of the aid will be long-term easy-payment loans for capital investment. Grant aid will be held down.

LONDON—

The British market is changing character. This change can be important to you if you manufacture or sell a consumer product.

Sales last year of consumer durable goods were substantially above any other year since the war. At first glance this might appear to be little more than a buying spree following austerity restrictions. But closer examination shows the beginning of a definite trend. You can expect the development of a large, one-class market.

Behind the change is the postwar rise of an "upper working class" with more money to spend. By contrast there are far fewer persons in a position to buy top luxury items. Installment credit buying is on the rise in England.

First to benefit from the new market will be British manufacturers of electric appliances and other consumer durables. But they will not be able to supply the demand alone. It is also unlikely—because of currency restrictions—that the U. S. will supply more than a small part of the market for many years to come. This can give manufacturers in the non-dollar areas an important head-start on the new market.

OSLO—

Hopes for a Scandinavian union, similar to the Benelux agreement between Belgium, the Netherlands and Luxembourg, have suffered a setback. Backers of the plan hoped to see the evolution of a customs union that they felt would benefit Denmark, Norway and Sweden—and possibly Finland. It is unlikely that any concrete progress will be made before next year.

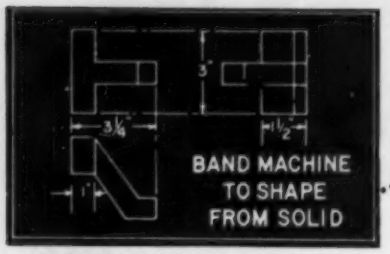
One of the stumbling blocks is a disinclination on the part of Norwegian industrialists to enter into uncontrolled competition with Sweden. Denmark, on the other hand, being largely agricultural, would benefit.

Meanwhile, experts are studying proposals for a unified Scandinavian market in chemicals, pharmaceuticals, iron and steel.

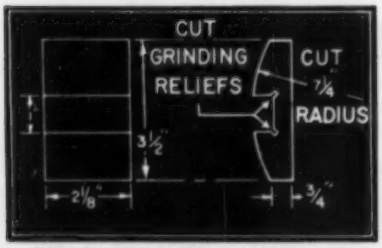
Cut Operating Costs with a DoALL

CONTOUR-MATIC

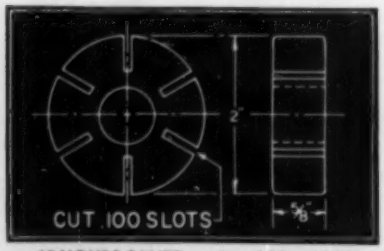
BAND MACHINE...



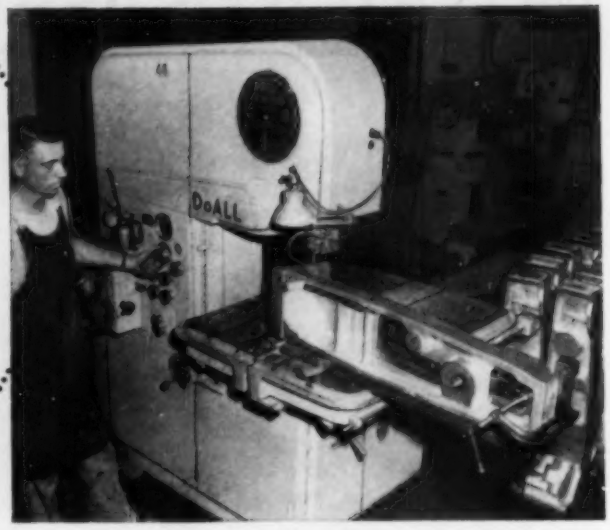
46.28 HOURS SAVED cutting mounting bracket from solid. 75 pieces formerly shaped in 60.00 hours, now band machined in 1.35 hours.



56% TIME SAVING in machining radius and grinding reliefs. 50 pieces formerly milled in 3.10 hours, now band machined in 1.35 hours.



48 HOURS SAVED cutting .100 x .4375 slots in rotors. 2000 formerly milled in 66.6 hours, now band machined in only 18.6 hours—72% less time.



New DoALL Contour-matic band machines have opened up an entirely new machining concept. An automatic hydraulic power feed table carries the work into the thin continuous-cutting band tool. Integral recirculating coolant system and air jet promote high cutting rates and long tool life. Cutting forces hold the work down to the table—only the simplest fixtures are required. Tooling cost is far less than for other machine tools. Setup and machining time is greatly reduced.

Faster cutting . . . lower tooling cost . . . lower capital investment (a DoALL power feed band machine costs but ⅕ to ½ as much as production milling machines, shapers or planers)—These are the money-saving advantages of DoALL *production band machining.*

For complete information, write:

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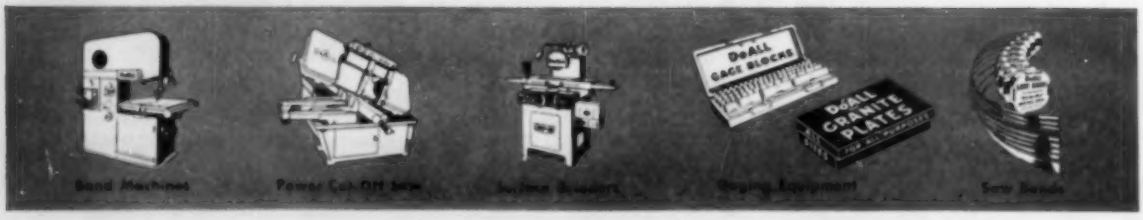
Agents in principal cities around the world

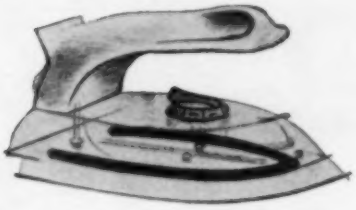
DoALL

B-23

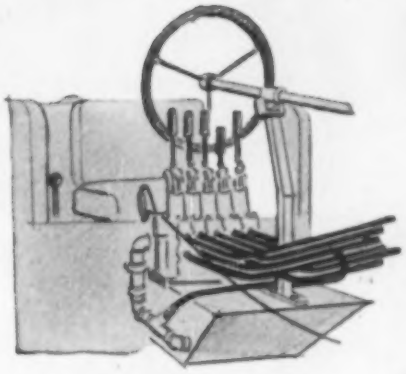


BUNDY TUBING COMPANY

FROM *the Bundy Sketchbook*
TO *jog a designer's imagination*



SHEATH FOR HEATING ELEMENT IN HAND IRON



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REMARKS Designing a new product? Or redesigning an old one? Why not avoid delays, expense by turning your tubing headache over to our engineering experts. They offer you a wealth of problem-solving experience, plus the priceless bonus of Bundyweld, the only tubing double-walled from a single strip (see below).

WRITE today for catalog or for help in developing your tubing application.

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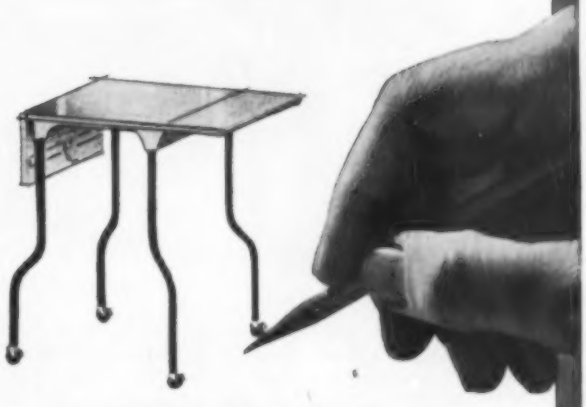

FRAME FOR TYPING TABLE

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continuously rolled twice around laterally into a tube of uniform thickness,

and passed through a furnace. Copper coating fuses with steel. Result . . .

Bundyweld, double-walled and brazed through 360° of wall contact.

BUNDYWELD TUBING®

DOUBLE-WALLED FROM A SINGLE STRIP

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High thermal conductivity	Machines easily
High bursting point	Takes plastic coating
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Extra-strong	Bright and clean
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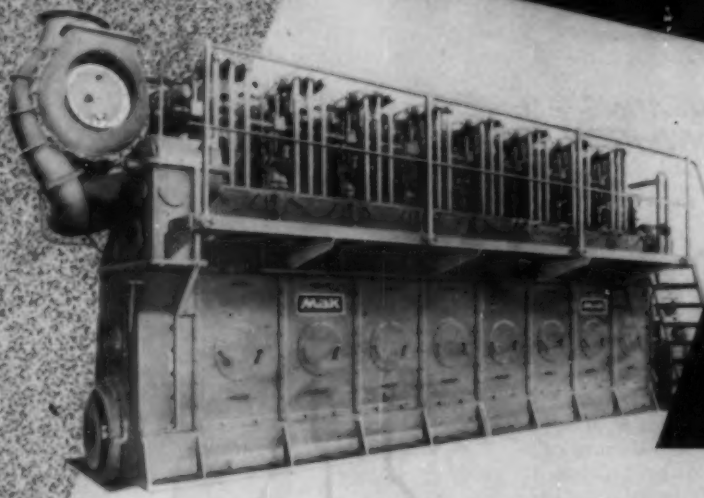

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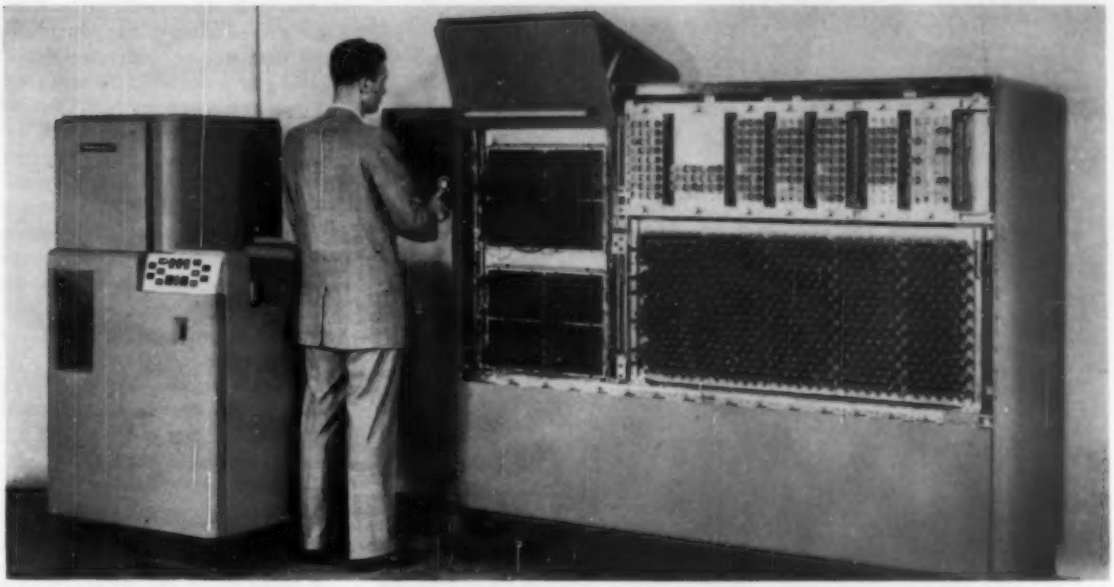


NEW-PRODUCT DEVELOPMENT, applied research to fill a known need, produced the Remington Rand Univac 120. This versatile computer will itself be an important factor in other research programs.

Research And Your Future

Ask yourself: What will happen to your business in 10 years? Does your current research program protect the future of your company?—An original Digest article

CRAWFORD H. GREENEWALT, president of E. I. du Pont de Nemours, has estimated that half of the U. S. labor force is engaged today in the production and sale of things that were almost totally unknown at the beginning of the present century.

The implications of this condition in industry are profound. Reduced to simplest terms it means that the cycle of introduction to obsolescence of any given product has been greatly accelerated. In such rapidly advancing fields as electronics, for example, the cycle can be as short as 4 to 5 years.

And this in turn means that a company's predictable future is no brighter or better than its current program of research and new-product development.

This realization does not, however, solve the major problems that face every individual company: How much is it justified in spending on research? What form should a research program take? Should emphasis be placed on pure research in related but unexplored fields, or should it be limited to development of new products for which there is a probable or proven market?

These are questions that can be answered only by top management, and they are becoming an increasingly important factor in setting long-range company policy.

In the final analysis, any company's research policy is dictated by such practical considerations as financial resources, competition, and the availability of engineers and technicians. The real problem lies in identifying and evaluating the factors that bear on the final decision.

The first step toward a research policy is a close examination of all products currently manufactured. What is the predictable life of each product individually, if there are several? What is the sales trend for each product? Is it rising or falling, and does this trend indicate real demand?

What is happening in the overall field of each product? Very few products stand entirely alone.

What is the contribution of each individual product to the company's total income from sales? And what is its contribution to costs? (See What's the Real Cost?, McG-H Digest, Mar, p35)

Examination of this sort may prove that continued diversification of manufacture is unduly costly and that one or more products should be allowed to expire when their markets drop off. Such a finding will make a very considerable difference in research policy, as it may be decided that the company's activities should be limited in scope and concentrated

PURE RESEARCH showed that an electric current passing through a junction of two dissimilar materials can produce a cooling effect. Further experimentation by Radio Corp. of America produced this experimental refrigerator.

in an narrower field. This could mean more profound research on fewer subjects.

Are there other, perhaps more profitable fields, in which present tooling or manufacturing facilities could be utilized? Do industry trends indicate research in these fields? In the case of broadly held corporations, how will stockholders react to expenditures on research that may effect dividends?

Each of these factors will have to be duly weighed and considered in determining basic company policy.

What about the type of research indicated? Pure research is generally understood to be the study of materials or properties without regard to specific applications. New-product development, on the other hand, is aimed at ultimate production of a given product. There is no hard and fast rule that says the manufacturers of a given product should engage in one and not in the other.

Pure research in the electronics industry, for example, might be thought to have more scope. But it is perfectly conceivable that a manufacturer of office furniture who experimented with materials could come up with something that would give him a decided competitive advantage. But easily the most prevalent type of research, particularly in the consumer fields, is in the improvement of existing articles.

From Research: Diamonds

Routine investigation, 4 years ago, into what happens to materials under high temperature and pressure led the General Electric Co. to a discovery of man-made diamonds.

The diamonds, GE says, are not imitations. They are identical to the gem made by nature. They produce under X-ray, for example, the same distinctive patterns as natural stones.

Research will continue, faced now with other problems—cost and size of the stones produced.

Hugh Colvin, executive vice president of the Consolidated Engineering Corp., a 1,400-employee company in the electronics field, has outlined some of the considerations that his company weighs in arriving at a decision on research.

First, the company must decide in which fields it should work, or, more specifically, on which projects it should work. In a relatively small company it is not the technological success that counts most, but rather the long-range economic accomplishment of being able to develop products that will bring in the most profits over the longest period of time.

The second consideration, related directly to the first, is that of control over the projects from the standpoint of time. This also ties in with the question of technical and other manpower, facilities, capital, estimated rate of expenditures, and calendar time.

A third point that plays a part in Consolidated Engineering's planning is the interrelationship of research and development with manufacturing and marketing operations and with the financial planning of the company.

Full benefits of research can be realized only if the manufacturing end of the business can turn out the product economically and efficiently, if the marketing division can sell it in sufficient volume, and if finances of the company permit securing the working capital and fixed asset capital required for exploitation. Obviously, this does not apply to basic research into the properties of materials or power sources. On this type of research it is practically impossible to measure predictable return.

Another company, General Mills, Inc., has managed to devise a formula for its own guidance in determining justifiable research expenditures. After long and careful study of its operations, General Mills knows how many dollars of plant investment are required to generate a given volume of sales. Similarly, it knows the approximate relationship between annual sales volume and working capital, and, from market research, about how rapidly new business should

Median Figures for 1952 Research Expenditures in 191 Leading Companies*

	Per cent of 4,800 Respondents Supporting Research	Per cent Research to Sales	Per cent Increase in Spending over 1951	Dollars Spent per Research Worker	Per cent Profes'l to All Research Personnel
ALL FIRMS	44	1.3	13	8,400	46
By Industry					
Food and Kindred Products	31	0.3	8	8,300	46
Textile and Apparel	34	0.7	7	8,200	39
Furniture	27	0.5	9	6,500	19
Paper, Lumber, and Wood Products	28	0.7	15	7,100	49
Industrial Chemicals	74	2.9	15	9,400	45
Drugs	59	4.9	12	9,600	46
Paints	72	1.7	8	6,800	52
Miscellaneous Chemicals	69	2.4	9	7,700	39
Petroleum and Coal Products	40	0.7	14	9,000	43
Rubber	53	0.9	21	8,500	66
Stone, Clay, and Glass	42	1.3 (est.)	14	7,700	37
Primary Metal	43	0.9	11	8,500	40
Fabricated Metal	40	0.7	10	9,600	53
Machinery except Electrical	61	1.4	12	7,300	39
Electrical Machinery	71	2.7	17	8,200	44
Transportation Equipment	51	1.4	9	9,700	36
Laboratory Instruments	87	3.0	40	7,300	37
Mechanical Instruments	69	2.0	11	8,900	52
Other Professional, Scientific, and Controlling Instruments	79	2.0	14	10,000	50
By Size of Company					
Less than 500 Employees	32	3.4	10	8,200	59
500– 2,000 Employees	80	2.0	16	8,100	49
2,000– 5,000 Employees	94	1.4	12	8,000	45
5,000– 7,000 Employees	96	1.2	12	8,200	50
7,000–10,000 Employees	97	1.5	13	8,500	46
10,000 Employees or More	99	0.8	14	8,700	41

*Dearborn, DeWitt C., Knezek, Rose W., Anthony, Robert N.: "Spending for Industrial Research 1951–1952", Division of Research—Harvard Business School.

pay for itself (recoupment period).

Finally, General Mills recognizes that a new venture must pay back not only the cost of the plant and the working capital but also the non-tax deductable portion of research and development expenses.

These factors General Mills identifies as follows:

P = plant investment
W = working capital
R = research and development costs before taxes
r = fraction of research and development costs not tax deductible
Y = recoupment period
S = annual net sales volume
N = minimum acceptable net profit after income taxes on sales in percent

and from these factors it builds the following equation:

$$\frac{P + W + Rr}{Y} \leqq S\,N$$

or

$$R \leqq \frac{1}{r}\,(YSN - P - W)$$

R. H. Manley, managing director of General Mills' research laboratories, admits that this formula does not supply all the answers. It does not, for example, take into account the projects that fail. But it does give management a *guide* to allowable outlays for research and development.

Talk Work Away

Make work easier with a dictating machine and a system. Here's how other executives do it

DIGESTED from American Business, January, p12—Dictating machines can be more than a tool for speeding letters and correspondence. Much of today's outside business is done by telephone—important decisions, binding agreements, substantial orders. But the telephone gives neither party a solid record of commitments or promises. Combine the telephone with a dictating machine and you overcome this objection.

Orders can be written directly from the machine's records. Typewritten transcriptions can act as written confirmations. Untranscribed recordings can also be slipped into standard files for possible further need.

Dictating devices can also help speed up conferences and meetings. You can proceed this way to save everybody's time:

- Meeting organizer dictates questions and topics into written form.
- Copies go to all participants in advance.
- When the session is called, research is on hand and ideas are formed on the basis of considered, rather than snap, judgment.

In organizing ideas, jot down your notes, putting subheadings on these, and then dictate from resultant material. This can help eliminate several drafts and move your ideas toward finality.

If you have material left over, dictate a series of "add notes," so called, each in a separate paragraph. Cut these apart, staple them to the right places, organize everything in rough form, and then either give it to your secretary to retype, or, if it is considerably marked up, redictate it.

Here's another way of handling ideas. When an idea occurs, dictate a note about it. Have your secretary put these notes on separate sheets so that you can pick out anything you need.

INSPECTORS sit at end of each of three final-assembly tables. They test thermostats selected at random from their production line. Signal lights tell operators how they are doing quality-wise.

Quality Control by Samples . . .

. . . on a continuous inspection basis makes possible this company's switch from job-lot production to mass production. It also cut costs drastically

DIGESTED from Factory Management & Maintenance, Feb, p114—When production schedules rose, Minneapolis-Honeywell Regulator Co. switched manufacture of its new round thermostats from a job-lot basis to mass assembly. This meant major changes in layout, materials handling, and work methods. The key to making mass production work was in continuous sampling inspection. This technique saved $133,000 annually.

M-H organized for mass production this way:

1. Final assembly was changed from an unbalanced to a balanced line by rearranging operations. *Result:* minimized waiting time.

2. Work stations were redesigned for shorter motion paths and more convenient positioning of assembly parts. *Result:* reduced individual operation cycle time.

3. Three final-assembly tables, 12 calibration stations, and the packing work area were located along a horizontal conveyor's path. *Result:* better materials handling, no congestion, more in-process storage.

The method of controlling quality, continuous sampling, makes the assembly line function successfully. Here's how the line works. Subassemblies come to the three final-assembly tables in trays. As operators assemble the thermostats, they move them from station to station along the table. The final assembler puts the assembled units on the conveyor, which in turn carries the thermostats through calibration to packing.

At the end of each table sits an inspector. At specified intervals, the inspector selects a unit for inspection just as the final assembler puts it on the conveyor. Because inspection is continuous, there is no accumulation of units. Correct sampling ratio assures accurate results.

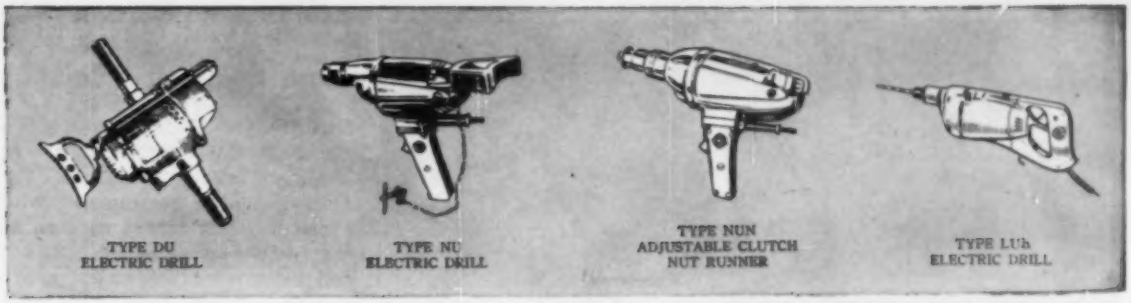
The inspector makes three separate inspections at the same time: one for critical defects, another for major defects, and the third for minor defects. Inspected thermostats free of defects are put on the conveyor by the inspector. Defective ones are tagged and given to the group or line leader for examintion. The nature of the defect is stated on the tag.

The results for each unit inspected are plotted by the inspector on three acceptance charts—one each for critical, major and minor defects. The location of these plot points tells the inpsector whether to continue sampling or to reject the line's product. Each chart's horizontal scale represents the number of units inspected while the vertical scale shows the number of defects found.

If a sample has no defects, the point is plotted one line to the right of the previous point on the same horizontal line. If there is a defect, the point on the chart for that classification of defects is placed one line to the right of the previous point and one line above.

Each inspector has three defect data sheets, one for each acceptance chart. Types of defects are tabulated on these sheets. Other information noted includes:

- Number of units inspected



TYPE DU
ELECTRIC DRILL

TYPE NU
ELECTRIC DRILL

TYPE NUN
ADJUSTABLE CLUTCH
NUT RUNNER

TYPE LUh
ELECTRIC DRILL

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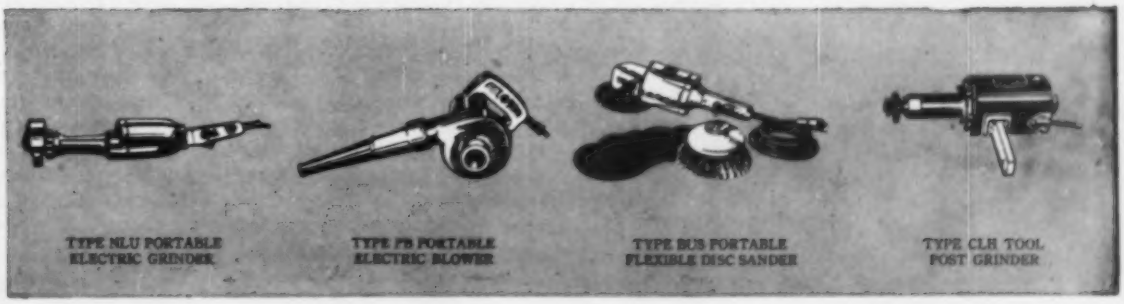


TYPE NLU PORTABLE
ELECTRIC GRINDER

TYPE PB PORTABLE
ELECTRIC BLOWER

TYPE BUS PORTABLE
FLEXIBLE DISC SANDER

TYPE CLH TOOL
POST GRINDER

THREE CHARTS make it easy for inspector to determine quality level with a variety of product characteristics. Charts show (1) critical defects, (2) major defects, (3) minor defects.

when final disposition of the process was made.

- Disposition of thermostats—whether accepted or rejected.
- Number of defective units.

The acceptance charts are designed to help inspectors make decisions easily. Several slanting lines divide each chart into sections. A plot point in any section has a specific meaning to the inspector.

If a point is below the lower slanting line (accept area), the process is acceptable. M-H starts a new chart whenever it reaches the "accept" area.

If a point is above the upper slanting line (reject area), the product is not meeting quality standards and the process is rejected. A rejection ticket is made out and the rejection procedure is set into motion.

If a point is between the upper and lower lines, sampling continues at a normal rate of one unit per specified number of thermostats.

If a point is still between the upper and lower lines at the end (extreme right) of the chart, the process is considered accepted, and a new chart is started.

When the process is rejected, the inspector notifies the group leader and fills out a rejection ticket. The ticket states in which classification the product was rejected. A sorted lot of specified size is then started. These units are *not* placed on the conveyor until the lot is released.

The sorted lot must be free of all defects in the classification causing rejection. To inspect a sorted lot the inspector samples trays of 20 thermostats brought to her by the operator at the end of the assembly table. In classifications not causing rejection, normal sampling and charting are continued. If the sorted lot passes inspection, the group leader signs the rejection ticket and returns it to the inspector.

When a sorted lot fails to pass: (1) the rejection ticket is returned to the inspector, who makes the notation "sorted lot rejected;" (2) the inspector notifies the inspection group leader, who in turn calls the department foreman; (3) the rejected sorted lot is then 100% inspected.

With the release of the rejection, the sorted lot is placed on the conveyor by an operator. Then a new chart in the classification is started.

Colored warning lights relay quality standing to operators and supervisors. Each zone on the acceptance charts has a distinctive visual signal. Green shows acceptable quality; yellow, a drop in quality; flashing yellow, close to rejection; and red, rejected.

Cheap Paint May Cost More than Good Paint

Digested from Petroleum Processing, Feb, p201—Cheap paint is no bargain if it doesn't stand up. The first cost of a coating job with cheap paint is almost as high as that with good materials. And it can cause excessive maintenance and replacement cost.

To protect plant equipment structures, these factors are important:

1. Surface preparation is often the most expensive step. If it is not done properly, the paint coating will fail.

2. The proper paint should be chosen. Its specifications will depend on plant environment and local atmospheric conditions. Cost averages about 25% of the complete painting cost.

3. Paint should be applied properly. A synthetic alkyd-type enamel, for example, should be preceded by a red-lead-zinc chromate or red lead-red oxide prime coat, a second prime coat in 30 days or less, and an intermediate prime coat of iron oxide. Two finish coats would then finish the job.

4. Paint coat should be protected by proper maintenance. Repainting may be difficult as proper surface preparation may be impractical or impossible. The moral —do it right the first time.

Carbide Shims Aid Tools

Digested from American Machinist, Jan 17, p101—Two foremen at New Britain Machine Co. (New Britain, Conn.) have developed a solution to the problem of getting both hardness and toughness with carbide cutting tools. They apply a soft, but tough, grade of carbide as a brazing shim between the steel shank and the hard carbide tip.

The tool overcomes the excessive chipping and cracking on heavy-duty machining of steel forgings, holds to size, cuts first costs and regrinding costs. It outperforms conventionally brazed tools as much as five to one, equals or outperforms mechanically held tips. A double-brazed tool costs about $12, while mechanical holders cost from $27 to $40.

New Ideas Tell How To . . .

. . . maintain unused equipment

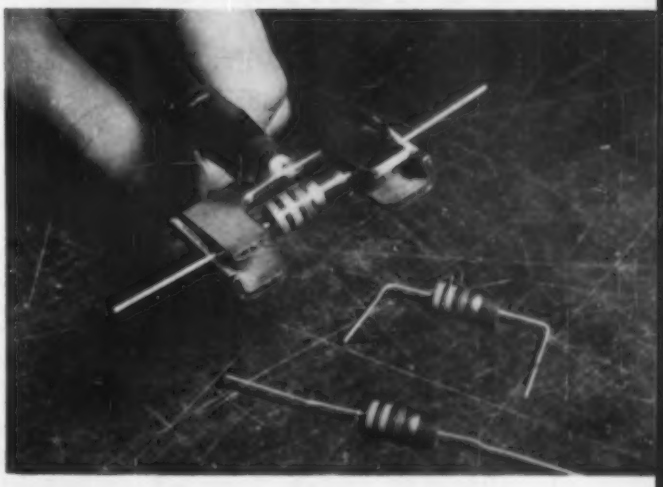
Digested from Factory Management and Maintenance, Feb, p156—Except in emergency installations, a lot of time elapses between the time a piece of equipment comes off the production line and the time it is installed.

This is particularly true of transformers. To prevent contamination from such things as fly ash and cinder dust, General Electric's transformer department now ships transformers—up to 167 kva.—in clear polyethylene bags. The bags provide excellent protection and still permit name-plates to be read without removing the transparent cover.

. . . bend pigtail leads

Digested from Electronics, Feb, p260—Formed steel jaws brazed onto longnose pliers serve as efficient hand tools for bending both leads of small components simultaneously. Correctly formed, the jaws will produce the required shapes for use on standard resistor terminal boards or on etched wiring plates.

The central opening in the fork-shaped jaws accomodates the body of the part and provides automatic centering. Either single or double bends can be obtained by appropriate shaping of the jaws.



. . . step up canning speed

Digested from Petroleum Processing, Feb, p237—A turntable device, called an Unscrambler, has increased canning speed of motor oil at Shell Oil Co.'s Sewaren, N. J., plant. The turntable receives cans from two conveyor lines leading from railroad box cars and feeds them to a single conveyor leading to the canning machine.

Present flow to canning machine is steady. With only one conveyor in previous set-up, flow was intermittent. This limited canning production.

The turntable is a slowly revolving flat disk about 8 ft. in dia. An automatic brake guides oncoming cans to the outer edge of the table and keeps them from knocking each other down. Speed of rotation is regulated to ensure receiving and discharging cans at the desired rate.

STATLER HOTEL (Dallas) has 18-story flat-plate concrete frame. Shear walls give lateral strength.

LEVITTOWN, Pa., grew to 10,000 houses with the addition of 5,900 in 1954 by Levitt & Sons; 7,000 more will be built.

Building Construction Trends

Last year was a big year for building construction in terms of volume. Meanwhile trends in techniques and materials continued to hold builders' attention

DIGESTED from Engineering News-Record, Feb 17, p80—Last year was another big year for the building segment of the U. S. construction industry. Besides the high level of activity, some of the newer materials and construction techniques continued to make progress in 1954. Basically the new materials and techniques were designed to make the construction dollar buy more construction.

One of the most significant developments was a strengthening of the trend toward thin curtain walls for tall buildings. Some of the walls erected last year were less than 1½ in. thick and weighed less than 4½ lb. per sq. ft.

The reasons for this are obvious:

- Decreasing the thickness of a wall increases the rentable floor area and hence the rental income.
- Reducing the weight of a wall enables appreciable savings to be made in the structural framing and foundations around the exterior of the building.
- In some cases, the thin wall cost less than conventional masonry wall in place. In most cases, maintenance costs for the light walls are expected to be less.

Perhaps the lightest curtain wall built to date for a tall building is for the 36-story Republic National Bank Building (Dallas, Texas). Average weight of wall, excluding glazing, is only about 2 lb. per sq. ft.—4.5 lb. per sq. ft. including glazing. The bank wall consists of ⅛-in.-thick, story-high aluminum panels, each incorporating a window, backed up with glass-fiber insulation and an aluminum-foil vapor seal. Total thickness of this wall is only 1½ in.

During 1954, more applications of the lift-slab method of construction appeared to be evident. An increasing percentage of the jobs as multistory.

A new trend in prestressing concrete beams came to light last year. There has been a marked increase in pretensioning. This method requires the placing of concrete in the beam forms after the tendons are stressed; transfer of the prestress to the concrete is through bond.

Several fabricators last year set up permanent plants for pretensioning. Their objective was to combine the advantages of mass-production precasting with those of prestressing to meet competition.

Progress also was made last year in design and construction with prestressed block beams composed of machine-made concrete block. The most important design improvement was an inexpensive method for establishing continuity. In one job, precast, prestressed members were erected as simply supported beams, then made continuous with cast-in-place concrete. To resist tensile stresses due to negative bending moments, reinforcing bars were placed on top of the beams at supports and encased in the cast-in-place concrete. As a result, the beams are continuous under live load.

Consumption of plastics in construction reached more than 400-million lb. Headway is being made with plastics for piping, conduit, ductwork, vapor seals, insulation, and light-transmitting panels. Several structures have been re-roofed with a sprayed-on plastic skin, and a 15-story concrete hotel was coated on the outside with such a skin, eliminating flashings, copings and calking. Also, studies were made to develop laminated and reinforced-plastics wall panels.

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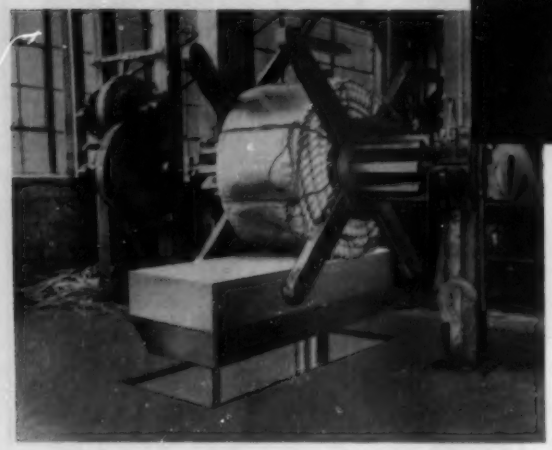
GLOBE OiLIFT

— makes a → tough job easy in this rope factory



In this rope production plant, two fork lift trucks were formerly used to raise giant coils of manila rope, weighing from 3,000 to 8,000 lbs., many times daily. Because the trucks were required to stand by idly while workmen wrapped the rope for shipment and then removed the reel from the coil, much time was lost before the trucks could return to productive labor elsewhere in the plant.

Installation of a Globe OiLIFT greatly simplified this cumbersome operation, released the fork trucks from wasteful stand-by time, and speeded up the whole rope production process. This is just one example of how Globe OiLIFTS are bringing modern handling ease to countless lifting, loading, positioning, and materials handling jobs throughout the world.

Globe OiLIFTS are carried in stock in a variety of sizes and designs. Use the coupon below for complete information.

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IMMEDIATE SHIPMENT

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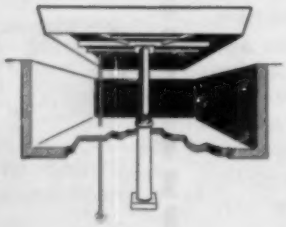

Standard OiLIFT platforms measure from 6' x 6' to 8' x 10' and raise to any level up to 58". Floor is non-skid steel plate. Beveled "toe guard" serves as safety feature. Non-rotating bar holds platform steady and guides its descent into floor recess. In "down" position, platform is flush with floor area.

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Tests Titanium Alloy for Aircraft Hardware

Digested from Aviation Week, Jan 10, p37—Titanium may someday be widely used in the manufacture of nuts and bolts for aircraft, as it already is in structural components. But for some of the hardware, the transition will have to be gradual.

Elastic Stop Nut Corp. of America is producing prototype titanium-alloy locknuts for evaluation programs, but wholesale use of these nuts lies well in the future, the company says. Manufacture of titanium-alloy bolts will come first. Stainless-steel nuts can be used with these bolts for a substantial saving in weight.

The problem lies mainly in finding a suitable titanium-alloy that will be available in quantity. But manufacturing techniques will also require close attention and improvement. There is a close relationship between the design of a self-locking nut and the fabrication problems associated with making this nut in volume. Hard tools with deep cuts under power are required for titanium alloy, resulting in a nut cycle time four times slower than that for steel.

Foreman's Biggest Job

Digested from Factory Management & Maintenance, Jan, p146—Managing people is the foreman's biggest job. So Jack & Heintz, Inc. gave its foremen special instruction in how to handle people. A course in applied psychology, adapted to fit the company's needs, was set up. Its objective: help each foreman find the answer to personal managerial problems himself—by a thorough self-analysis.

A psychologist was brought in to set up a 32-hr. course, 2 hr. a week. Basis for each session was a 30-min. lecture on human relations principles. The next 90 min. was devoted to a discussion of case examples. Foremen brought to class their own specific plant problems. The second phase of the program brought psychologist and foreman together for private discussions of the foreman's problems.

Diversify for Safety

Specialized production can be economical. But it can be dangerous if a market fails. The best hedge against overemphasis: new-product development

DIGESTED from Business Week, Jan 29, p72—A new-product venture is a far more critical venture for a small manufacturer than for a big one. In some cases, failure of a product can mean failure of a company. But if the venture is properly approached, a new line can do much to strengthen a company's position.

Stow Manufacturing Co. (Binghamton, N. Y.), a relatively small producer of flexible shafting, found in 1947 that 41% of its output was going to a single customer and that much of the remainder was being bought by the U. S. Navy.

While this meant prosperity while it lasted, Stow was faced with the realization that its entire operation stood on a far too narrow base. The soundest alternative was to introduce a new product that would appeal to a wider market.

To minimize risk, Stow utilized the services of a consulting firm to which it gave the task of evaluating the possibilities of a powered, rotary, concrete trowel suggested by Stow distributors. The consultants went ahead with this program:

- Made a thorough study of the potential market. This confirmed that such a trowel could be sold. They then established the price that would be acceptable to buyers and thereby cancelled other ideas that did not prove as promising.
- Made a survey of existing rotary trowels. This told Stow what users felt the tool should do and gave Stow a chance to incorporate several new and exclusive features.
- Produced a preliminary design on paper—so drawn as not to infringe on any existing patterns.
- Produced a prototype trowel that incorporated suggestions from Stow's engineers and those of a hand-picked sample of users. This became the basis for production drawings that Stow then undertook itself.

Stow's first shipment of 50 trowels was made just 11 months after it put the project into the hands of the consulting firm. It will take sales of 400 trowels to offset the cost of the consulting firm that Stow retained. On the other hand, Stow estimates that it will get 500 orders this year alone.

Meanwhile, Stow is not counting entirely on sales of the trowel to broaden its marketing base. It already has in early stages of production a device that can connect rotating shafts at any angle—including 360°. This particular idea came from the company's own engineering vice president.

To get more new products, Stow is willing to buy well-developed ideas. For example, it found one right in its own orders-received book. An inventor had developed a rotary scraper to strip paint from clapboard. His design called for a length of flexible shaft that he had been buying from Stow. Alone he was unable to develop the product to the extent necessary to capture a large market, so Stow bought the idea on a royalty basis. The result: a further broadening of Stow's market at little cost.

Last year Stow's business was beginning to feel some of the effects of diversification. Only 32% of its business was with the government and its other large customer. The rest was with a far wider range of customers.

Among other business-boosting ideas, President C. F. Hotchkiss, Sr. has taken strong steps to improve sales of his original line. Advertising has been doubled. His sales force is called into full scale meetings at headquarters. He has started a publicity campaign, entered more trade shows, and even started a product-information program to college engineering departments. As a result of these various efforts, President Hotchkiss hopes business this year will top $1.6-million. But, as he puts it, "The best part of that increase is that most of the extra income will come from new customers."

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Radiation Sterilization of Food and Drugs

Digested from Nucleonics, Jan, p36 and 39—Where does radiation sterilization of food and drugs now stand? To find the answer to that question, *Nucleonics'* editors surveyed the organizations active in radiation processing research in the U.S. They found that:

Use on drugs, small surgical products, and potatoes is expected within a year; on meat, grain, and beer within 5 years; on packaged food within 5 to 10 years; and on dairy products within 10 years.

Certain applications will come faster than others. In the drug industry, for example, fewer problems will be met as side effects are not so important because of the small amounts of medicine taken. The most frequently mentioned product was meat; one company estimates that annual dollar volume of meat to which radiation processing could be applied is $2-billion.

Radiation processing of any product must be based on a thorough study of benefits and whether they can offset (1) the higher capital cost of equipment, (2) high operating costs, and (3) the cost of educating consumers to foods with new sensory characteristics and new cooking requirements. Such evaluation must follow the outcome of research.

Heavy Aluminum Coating

Digested from Chemical Week, Jan 15, p60—By combining pulverized aluminum with a vinyl resin vehicle, Woodhill Chemical Co. (Cleveland) has developed an extra-heavy coating for steel, concrete, wood, and other surfaces.

The coating, called Duro Aluminum Shell, can be applied by brush or spray to 8- to 10-mil thickness in one application. That's nearly three times the thickness of conventional aluminum-flake finishes. Duro hardens completely in 6 hr., can then be filed, buffed, or burnished.

Advantages also include effective protection from −40° to 600°F. and good resistance to crude oil, gasoline, salt water, and fresh water. It also acts as waterproof sealer and smoother for concrete.

Mr. Transport Chief—

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Aluminum Tunnel Forms Hold Promise for Swiss

Digested from Construction Methods & Equipment, Feb, p124—Aluminum forms for concrete are being tried out on several tunnel-lining jobs in Switzerland. Aluminum's lightweight permits fabrication of larger components outside a tunnel than is possible with wood or steel. A complete aluminum form can also be stripped with less labor and time inside a tunnel.

Forms consist of light sheets and supporting rings made of aluminum alloy. Sheets are extruded and have integral ribs. Assembled, they form a cylinder with a smooth outer surface. Rivets, bolts or conical pins connect the sheets at the ribs.

Supporting rings consist of aluminum T-shapes bent to the profile of the tunnel. Sheets are secured to the rings by wedges driven into place. Ribs on the sheet are shaped to work as guide rails for the wedges. Albert Aeberli (Zurich) developed the form.

Glass for Tomorrow from Age-Old Materials

Digested from Business Week, Feb 12, p182—When a Boston company introduced pressed glassware in 1825, glass blowers were so incensed that the inventor had to go into hiding for several days. Since that time, however, the glass industry has made steady progress in the development of new techniques and products. Among the latest innovations:

Multiforming—This is a new technique developed for making millions of tiny mountings used on television sets. Fine glass powders are mixed with a binder and molded to shape before heating. The technique is particularly valuable in making parts that are too small to cast.

Electrical Sealing — Another technique, worked out during the past 25 years, is used for sealing pipe and putting faces on television tubes. Glass to be sealed is heated by flame, then electric current is passed through the flame.

Tape—Shortages of high-grade mica during the war led to the development of ribbon glass. It is about 0.001 in. thick, can be rolled or twisted, and has electrical properties of high-grade mica. It is used largely in capacitors.

Cuts Banana Loss

DIGESTED from Mod Packaging, Jan, p109—Polyethylene film, a tough and versatile plastic packaging material, has found another use. It is the first efficient solution to the problem of the banana trade in minimizing the abrasive marking and scarring of bananas in shipment from tropical farms to retailers.

Polyethylene jackets of 0.0015-in. vented polyethylene tubing, 27 in. wide and cut to standard lengths of about 54 in., package entire banana stems. The jackets not only reduce damage but also cut weight loss because of moisture evaporation.

Torsion-Bar Suspension Eliminates Car Springs

Digested from Product Engineering, Feb, p202—Packard automobiles this year have something new and outstanding in riding quality. The rest of the industry is watching how the buying public will accept an automobile without springs.

Instead of springs, Packard is using torsion-bar suspension, which the company calls Torsion-Level Ride. While this type of suspension is not new (Porsche had it on racing cars in 1938), it's the first application on American automobiles.

One bar runs the entire length of each side of the car from the front cross-member to the rear-axle torque arms. Load arms attached to both ends of the torsion bar transmit rotary motion of arms into a twisting action of the bar. Thus when a front wheel hits a bump, the torsion bar twists and, in effect, absorbs the shock.

Packard has also added a load compensator. This device consists of two additional torsion bars about half as long as the main bars. It keeps the car body on an even keel regardless of passenger and luggage loads.

"Threads of Gold"
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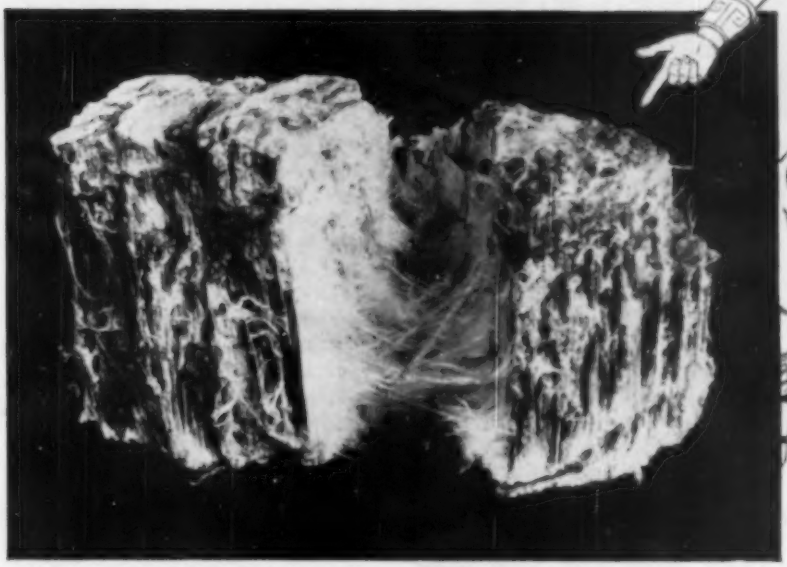

The mineral Chrysotile, meaning golden fibers, or threads, supplies over 90% of the world's asbestos requirements. Called the "miracle mineral" by the ancients, the Roman naturalist Pliny (23-79 A.D.) refers to the use of such material as "a rare and costly cloth" used for the funeral garments of kings.

The secret of the great usefulness of asbestos lies in its unique combination of fibrous structures, fire and water resistance, flexibility and strength. Since the profitable recovery of asbestos fiber depends upon fine crushing without destroying fiber length, a crusher that will perform such functions economically, and will produce large quantities of finely crushed material is essential.

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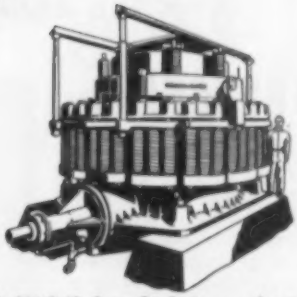

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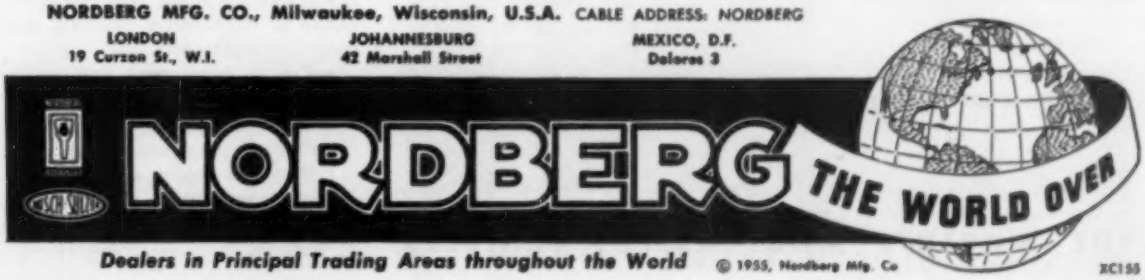

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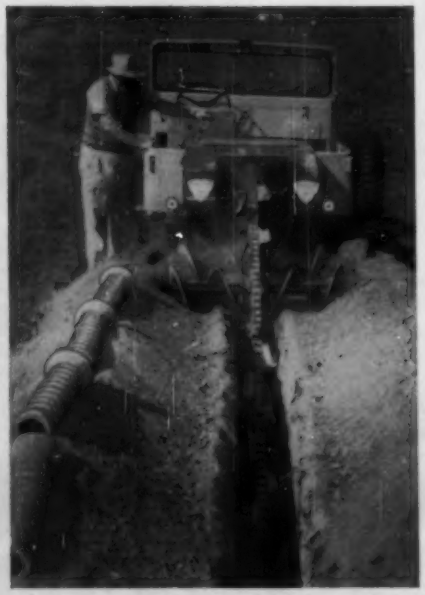

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Automatic Control Cuts Acid Cost 50%

Digested from Textile World, Jan, p80—Automatic sulfuric-acid dilution system as Standard-Coosa-Thatcher Co. (Chattanooga, Tenn.) paid for itself in the first year of operation. The system supplies mercerizers and a bleaching range with an acid bath.

Concentrated sulfuric acid is purchased in tank-car lots to take advantage of bulk rates of half the carboy price. Workers no longer handle the acid; safety has been increased. The system automatically makes up acid to the desired concentration whenever it is needed.

Controls, furnished by Foxboro Co., form a compact panel and regulate the system. Concentrated sulfuric acid is pumped from the tank car to a storage tank. From the storage tank, the acid is pumped to a head tank. Gravity flow takes the acid as needed from the head tank to a cutting tank where it is diluted to the required concentration.

The cutting tank is filled with acid to a low-liquid-level probe. Then water enters the tank until the level reaches a second probe. Contact with this probe closed the water valve and opens the acid valve. Enough acid is admitted to provide the desired concentration.

Policies Build Business

Digested from American Business, January, p22—Wm. Wrigley Jr. Co., world's largest chewing gum manufacturer, has five basic policies it feels have helped it stay out in front in its field, year after year. Briefly here are Wrigley's policies:

- Never follow competition—blaze your own trail.
- Never adopt a policy merely because it has been successful for some other company.
- Try to avoid peak and valley sales.
- Remember, it is the net that counts—not the gross.
- Have somebody in the organization urge people on to better efforts. This is the president's job at Wrigley.

New for the Kitchen: Packaged Components

Digested from American Builder, Jan, p110—Mass-production "packaging" of costly utility parts forms a new trend in small-home building. General Electric Co.'s newest answer for the kitchen—three built-in components—combine all major home-making functions without sacrificing design flexibility.

Basic component in the GE scheme is the "electric kitchen center." An 8½-ft. stainless-steel surfaced unit consists of a combination clothes washer-dryer, range with four flush-mounted cooking units, sink, garbage disposer, and dishwasher. Other units in GE's line include a wall-mounted refrigerator-freezer and a wall oven. The refrigerator-freezer saves 8.2 cu. ft. of storage space compared with a conventional refrigerator.

All components are available in white, turquoise green, canary yellow, petal pink, cadet blue, or woodtone brown. The range of colors now available is in itself a new trend.

Standard Sizes for Oil and Grease Containers

Digested from National Petroleum News, Feb, p149—The U. S. oil industry after years of confusion in packaging specifications is now making a serious effort to standardize containers. Some of the new standards:

55-gal. drum—Tight head for oil, removable head for grease. Both heads convex.

30-gal. drum—For oil. Tight head.

16-gal. drum—Tight head for oil and a lug cover for 120 lb. of grease.

5-gal. pail—Lug cover for grease.

2-gal. oblong can—For third-grade motor oil.

To date, these and other containers have been made in varying sizes and cubic content. For example, the 5-gal. pail, widely used for grease, has been turned out by 19 manufacturers, all working to slightly different standards.

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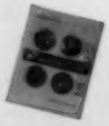

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New Phosphate Process Produces Fertilizer

Digested from Chemical Week, Feb 5, p50—Colorado Fuel & Iron Corp. has switched its Pueblo, Colo., mill to production of diamonium phosphate. Its process is the first DAP operation based on by-product coke-oven ammonia and electric-furnace phosphoric acid.

The new process resembles the standard sulfate recovery of ammonia from coke-oven gas, using phosphoric acid rather than sulfuric acid as the absorbent. Coke-oven gas is cooled, then piped into a sulfate saturator unit, and bubbled through the phosphoric acid.

The resulting slurry of diammonium phosphate goes to a feed tank, then to a centrifugal dryer to separate larger crystals from the mother liquor. The mother liquor is recirculated to the saturator while the crystals pass on to an auxiliary dryer and then to storage.

During processing, temperature, hygroscopicity, and pH must be closely controlled to insure maximum ammonia absorption, proper crystal size, and absence of caking in storage. The phosphate, with 74% utilizable plant nutrients, has a ready market as fertilizer.

Interlocking Forms Save Builders Time

DIGESTED from Construction Methods & Equipment, Feb, p88—Large savings in foundation costs are being effected by a West Coast home builder through an ingenious system of interlocking forms. R. H. Grant, the developer, employs a method of pouring foundations without excavating. Forms go up 16 times faster than with conventional form-building.

Forms are made of ¾-in. plywood with 2x3-in. bracing bolted to panels. Steel flanges project from ends. Panels are joined by driving pins through holes in the flanges. Forms are set up and joined wherever sections meet—at sides and at inside and outside corners.

Exterior-wall forms are vertical on the outer surface and sloping on the inner surface to give maximum load-bearing support. For interior walls, both sides slope.

A statement by S. D. Den Uyl, President of Bohn Aluminum and Brass Corporation and John C. Tooker, President of Reo Motors, Inc.

Bohn Aluminum & Brass Corporation purchased Reo Motors, Inc. on December 31, 1954. Now, backed by greater resources, Reo is embarking on an important new program of expansion in the manufacture of trucks and in service to users of trucking equipment.

In John C. Tooker, Reo's new President, Reo has a man of 30 years' experience in the trucking industry. His top management team in Engineering, in Manufacturing and in Sales, also are men of experience—and men of action.

We are going to get a major share of the medium and heavy duty truck market.

S. D. Den Uyl

PRESIDENT • BOHN ALUMINUM AND BRASS CORPORATION

Now, with the backing of Bohn, we have all the elements needed to implement our new program of expansion. It is already well under way.

From 16,000 pounds up to the heaviest duty trucks on the road today, Reo offers an array of the World's Toughest Trucks with gasoline, LP-Gas and Diesel power plants. Reo is the only exclusive truck manufacturer building truly modern 6 and 8 cylinder truck engines—the rugged Reo Gold Comets. Included is the 220 horsepower Gold Comet V-8, most powerful V-8 truck engine ever built. All Gold Comet Engines are backed by a 100,000 mile or one year service warranty.

Never before has Reo had so much to offer the user of motor transport. We invite you to Watch Reo Roll!

John C. Tooker

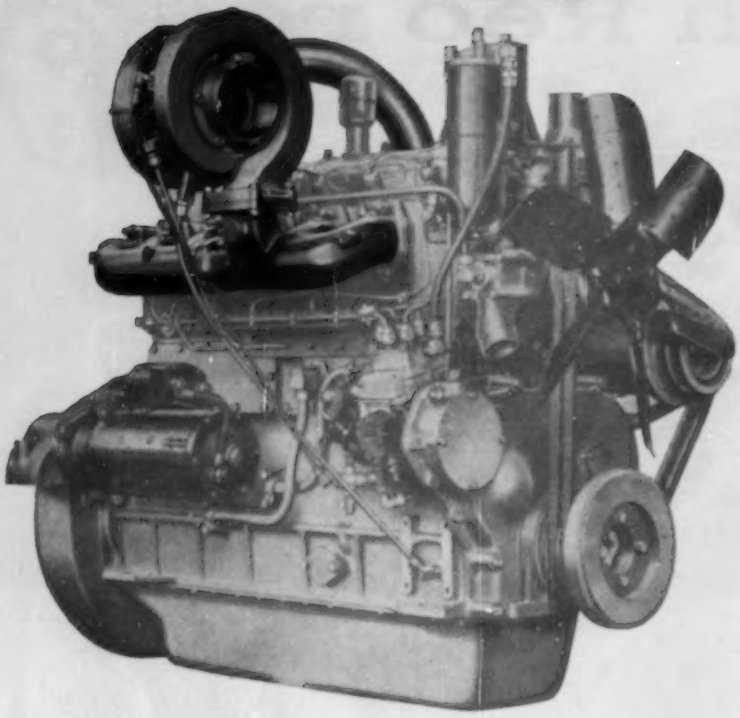
PRESIDENT • REO MOTORS, INCORPORATED

REO MOTORS, INC.

SUBSIDIARY OF BOHN ALUMINUM AND BRASS CORPORATION

WAUKESHA

TURBOCHARGED DIESEL



Greater Power at Lower Fuel Cost

Quoting from Waukesha Bulletin 1617:

"The Waukesha Supercharged Engine, Model 135-DKBS, is a compact, powerful, heavy duty, six cylinder, four cycle, full Diesel engine, of 426 cu. in. displacement . . . burns all high speed Diesel fuels having cetane values of 45 or above . . . offers lively acceleration, clean burning, prompt starting, tremendous reserve of power and great over-all economy.

"The exhaust turbocharger system of supercharging affords a great increase in horsepower with a minimum of parasite load. Even without an intercooler the maximum power available from the Model 135-DKB Diesel Engine is increased **from 146 hp to 185 hp at 2800 rpm.**"

Bulletin 1617 contains much more pertinent information. Write for it and for bulletins describing other Superduty, Supercharged Waukesha Diesel Engines to

Export Department

WAUKESHA MOTOR CO.

WAUKESHA, WIS. U. S. A.

Line Marks Road Edge, Cuts Vehicle Accidents

Modern highways, either divided or two-lane, have their center lines clearly marked. Last year a 3½-mile test section of Connecticut's Merritt Parkway had a shoulder line painted on each side. The highway's outer limits were thus clearly indicated. Studies show reduced accidents, increased driver confidence, and better driving habits.

The Dorr Foundation conceived the shoulder line and is now pressing for its adoption. Since Connecticut's original experiment, the idea has spread to several state highway departments. Late last year New Jersey completed 274 miles of outer-edge marking of two-lane, black-top roads. In Westchester County (N. Y.) the line has helped cut accidents 50% on one section of highway. Arizona, Kansas, and Virginia plan to mark several of their highways.

Connecticut experience indicates a cost of $50 per mile. A single crew can paint 3 mi. per hr. of single line.

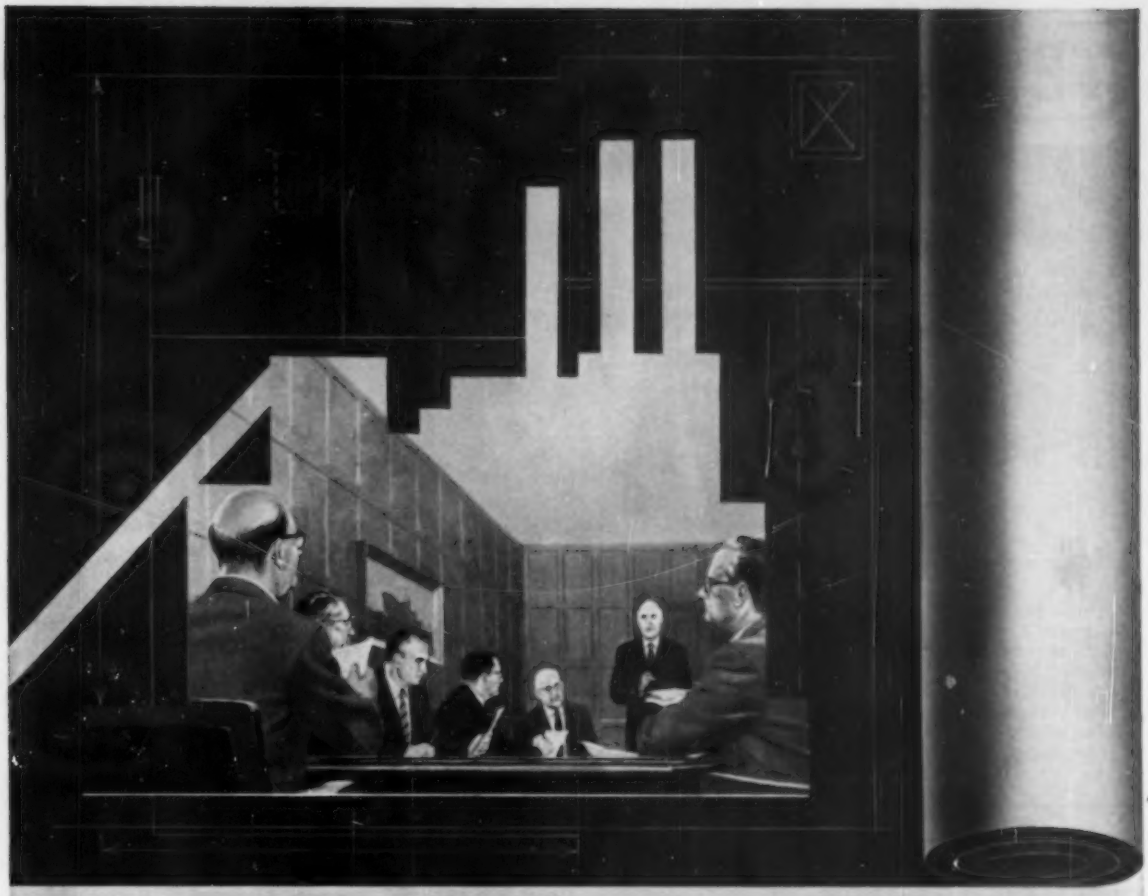
New Chemicals Offered

Digested from Chemical Engineering, Feb—New chemicals being marketed include:

▶ **Nickel catalyst,** G-29, is claimed by Girdler Co. (Louisville 1, Ky.) to give 25% greater production capacity for ammonia synthesis gas from natural gas by steam reforming. Other uses: production of controlled atmospheres and carrier and fuel gas; dissociation of ammonia.—p146

▶ **Resyn 60R-3132,** made by National Starch Products Inc. (New York), is a polyvinyl acetate emulsion soluble in alkaline deinking solutions used by paper mills. It allows a paper-product manufacturer to use a resin adhesive in processing and still get premium prices from paper mills for returned production cutting. —p142

▶ **Silicone rubber** with strength of other rubbers is the claim for Cohrlastic HT. New reinforcing fillers raise tensile strengths up to 2,000 lb. per sq. in. Maker is Connecticut Hard Rubber Co. (New Haven, Conn.)—p148



what's behind the plans behind the plant?

The engineers and constructors that stand behind the planning of your plant may well hold the key to its future success.

Taking your new plant from the planning stage to blueprints, through construction, and finally into successful operation, is a complicated process. It involves such considerations as site location, scientific space planning, new production techniques and requirements, design flexibility for future expansion, adaptability to any potential product switchover, and many other factors.

It is a process in which Ebasco can help you both practically and economically. Ebasco's half-century of experience encompasses the complete engineering and construction of more than two billion dollars of new plants, large and small, in this country and around the world. This is the experience behind the plans of every new plant Ebasco builds.

Ebasco offers the following services to business and industry:

Appraisal • Consulting Engineering
Design & Construction
Financial & Business Studies
Industrial Relations
Insurance, Pensions & Safety
Purchasing, Inspection & Expediting
Rates & Pricing • Research
Sales & Public Relations
Space Planning
Systems, Methods & Budgets
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Our booklet—"The Inside Story of Outside Help"—tells the story of Ebasco and its services. For a copy, write Ebasco Services Incorporated, Two Rector St., New York 6, N. Y.

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TECHNICAL IDEAS . . .

Tomorrow's Truck Today

Digested From Business Week, Jan 15, p27—A star of General Motors Corp.'s annual Motorama, currently touring the U. S., is a new GMC delivery truck. Styled by Harley Earl, the vehicle may be a preview of a complete redesign of GMC's truck line. The new truck has front wheel drive that permits it to be 10 in. shorter and lower than present panel models, with no loss of capacity. It will be sold as a panel delivery truck, as a small-size bus for special jobs such as carrying children to school, and as a large-size station wagon for rural and suburban use.

Stops Pile Slipping—From Sweden comes an idea for driving piles into rock shoal and reducing side slipping on underwater slopes. Pile is hollow, permitting a drill to operate through it. After pile is driven, hole is bored 30 in. into shoal. Then drill is removed and a 60-in.-long steel dowel is dropped to the bottom of the hole.—Const Meth & Equip, Jan, p16

Citrus Dehydrate—Developed after years of research by the Vacudry Co. (Calif), citrus juice in crystalline form is now ready for production. The citrus dehydrate requires no refrigeration, is lighter to ship, stores easily, and reconstitutes instantly in water. Flavor, appearance, and nutritional value are similar to the fresh juice.—Food Eng, Feb, p162

Nylon for Conveyors—A new conveyor made of molded nylon sections and links requiring no lubrication is made by Fenco, Inc. (Chicago, Ill.). Operating advantages include lightweight, smooth operation, and minimum power demand.—Mod Packaging, Jan, p108

Army Glass—Canadian Army is experimenting with fiber-glass toboggans especially designed for use in the Far North and with fiber-glass axe handles. Wood handles tend to dry out and work loose under Arctic conditions of temperature and humidity.—Ceramic Ind, Feb, p39

Better Fuel Consumption—Smog in Los Angeles and other cities has automotive people busy on reducing exhaust-gas hydrocarbons. One promising method will reduce hydrocarbon volume during deceleration by shutting off fuel flow in that period. Fuel economy will increase.—Pet Proc, Feb, p151

Form Lining—Wooden form for concrete lined with paper and polyethylene-coated tape produces concrete with a hard surface free of costly-to-remove fins and smooth enough to be painted. The paper is laid into the form, cut to fit, and pieced together with cloth tape coated with polyethylene. The process was developed by Lowe Paper Co. and Permacel Tape Corp. —Mod Plastics, Feb, p207

Plastic Hammers—Available in 13 weights and of different hardness, plastic hammers for metal forming are expected to save $1,391 monthly at Douglas Aircraft Co.'s Long Beach division. The company now replaces 1,333 fiber, lead and rawhide units a month. The plastic hammers, made by the New Plastics Corp. (Los Angeles, Calif.), are expected to cut this rate to 50 units.—Aviation Week, Jan 31, p34

Less Coal Waste—Crawler tractors give excellent results in packing outside coal piles. Proper packing with emphasis on cross-and-edge rolling for good sealing will do much to prevent hot spots and fires. A temperature probe made of ½-in. pipe and a thermocouple can be used to determine pile temperature. Periodic inspections will show up hot spots before they become serious.—Power, Jan, p132

Lengthen Battery Life—One company lengthens life of industrial truck batteries 50% with this maintenance program: Batteries are changed after 12-hr. service, checked for water level, cleaned if necessary. Once a month, exterior castings and covers are washed with baking soda to remove any spilled acid. Every week, batteries receive a slow, 4-hr. equalizing charge to bring cells to full strength.—Elec C&M, Feb, p109

Save on Waste—A Canadian worsted mill cut waste average from 13 to 7% with these three steps: (1) waste material was weighed daily for 3 months. (2) waste standards were set up for each employee. (3) a bonus was paid to employees reducing amount of daily waste.—Textile World, Feb, p96

Paper Spinning Chucks—Paper-plastic laminate has been developed by Formica Co. for spinning chucks, pattern boards, gluing jigs, stretch forms, and hydropress form blocks. One company spins 0.040-in. thick brass on a paper chuck to a tolerance of +0.007 in., −0 on a 3.409-in. dia.—Am Mach, Jan 17, p147

Dispenses Uniforms

Digested from Factory Management & Maintenance, Jan, p169—Automatic dispenser shown releases clean uniform to employee and stores soiled one until collected by supply service. All the employee has to do is turn a key and open a compartment door marked with his name—and he's got a clean uniform that fits. Called Change-O-Matic and made by Change-O-Matic Corp., the unit operates both as a clean uniform supply depot and soiled uniform container.

Packaged Heat Pumps—A six-story building in Decatur, Alabama, is completely air-conditioned by 13 packaged heat pumps supplied and installed by General Electric Co. Each floor except the first has a single-zone system. Installation costs are higher than on other systems, but operating costs are considerably lower.—Eng News-Record, Jan 27, p24

Titanium—Britain's Fulmer Research Institute has made titanium metal by "catalytic distillation," passing titanium tetrachloride over ore and a catalyst. Process is continuous, product is pure, metal does not have to be chipped out.—Chem Eng, Feb, p130

Water Barrier—Breaking the water barrier (about 200 mph.) is to speedboat enthusiasts what breaking the sound barrier was to jet pilots. A new English all-metal hydroplane may do it. A turbo-jet with 4,000-lb. thrust powers the boat.—Prod Eng, Feb, p205

For Tight Pipe Joints—The Lockrey Co. (Southampton, N. Y.) suggests the use of a molybdenum-disulfide compound for lubrication as pipe joint is being made up. Compound makes possible metal-to-metal seal of joint. Conventional pipe compound used to fill empty spaces between threads is always squeezed out, dried out, or broken up by vibration, whereas metal-to-metal seal will hold.—Factory, Feb, p154

Better Drilling—New electrical rotary percussion oil-well drill is expected to give excellent results in its first field trial. A percussion motion is imparted to the tool. In a recent surface test, it drilled 19½-in. of granite in 10 min., compared with 5½-in. with conventional rotary motion only.—Oil & Gas J, Jan 31, p119

Synchronous Motors Save—Two synchronous motors on Minnesota's Iron Range raised system power factor from 80% to 86%. A $500 per-month penalty was imposed for a power factor less than 85%. Each unit is a 600-hp., 60-cycle, 2,300-volt, 600-rpm. Fairbanks-Morse synchronous motor with 80% leading power factor driving a centrifugal pump.—Eng & Min J, Jan, p93

Skidless Stops—Meadville Research Corp. is testing a new disk-type brake, which does not lock wheel but slows it gradually as the car slows down. This lessens the chances of a skid, eliminates the sudden changes of speed that cause so many accidents. Developers say that units should cost no more than present power brakes.—Business Wk, Feb 12, p76

Teaching Arithmetic—A new method of teaching arithmetic fundamentals, developed by Dr. Andrew F. Schott of Marquette University, triples gains in achievement by students. A Burroughs "Instructor" adding machine accelerates achievement in the reasoning process and does not render the student helpless as when working problems only with pencil and paper.—Am Business, Jan, p43

Radioactive Material Finds Leaks

Digested from Factory Management & Maintenance, Feb, p110—At Rohr Aircraft (Chula Vista, Calif.), finding leaks in aircraft fuselages is easy. The units are pressurized, and workers on the outside listen for the hiss of escaping air. But this was the problem: how to locate the hole for the worker inside so that he could apply sealant. Under Rohr's new system, the outside man places a vial of harmless radioactive material directly over the leak. A small Geiger counter locates the leak for the worker on the inside.

ADVANCED ENGINEERING FEATURES

new

EXTRA-HIGH FLOW RATES

QUICK-OPENING LIDS

announcing

A COMPLETE NEW LINE

OF HONAN-CRANE

OIL FILTERS

... the first in a series of important engineering developments by the NEW Corporation... HOUDAILLE-HERSHEY OF INDIANA, INC.

"F" Type FULL FLOW

For in-line installation at high flow rates—25 to 800 GPM. Uses new "FLO-PAC" pleated paper cartridge to remove particles down to one micron.

"M" Type MULTI-CARTRIDGE

Eleven sizes to choose from. Six types of cartridge refills including new "FLO-PAC" and "KLEER-PAC" available to give exact degree of filtration needed.

"B" Type BULK REFILL

For absolutely clean oil, bulk Cranite medium provides depth type purification. Bulk or cartridge type cellulose refills available for fine filtering.

All Models Have Quick-Opening Lids

Purifier lid is fastened with swing bolts. Lid swings back for easy access to refills.

Write for engineering bulletins and quotations on all three models.

of Indiana

HOUDAILLE-HERSHEY OF INDIANA, INC.

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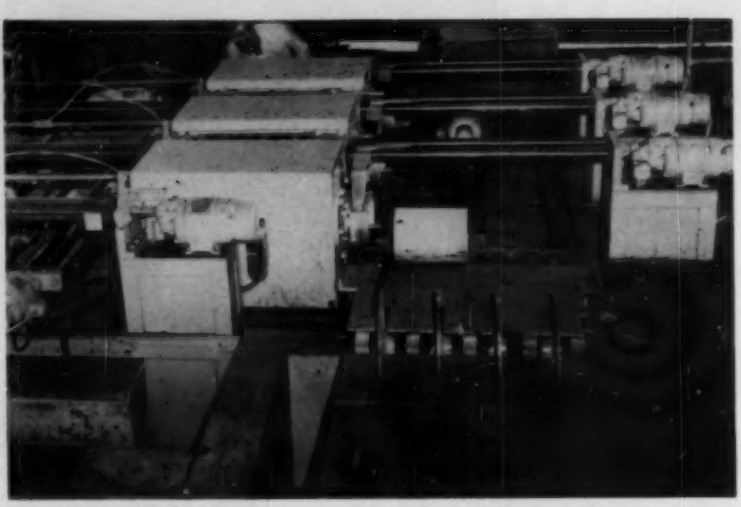


INDUCTION HEATER is easy to operate, needs less space than gas furnace it replaces. Each coil holds two billets.

Heat for Industry

With the emphasis on cost, efficiency, and product uniformity, industries are looking to electricity as a source of constant and controllable heat

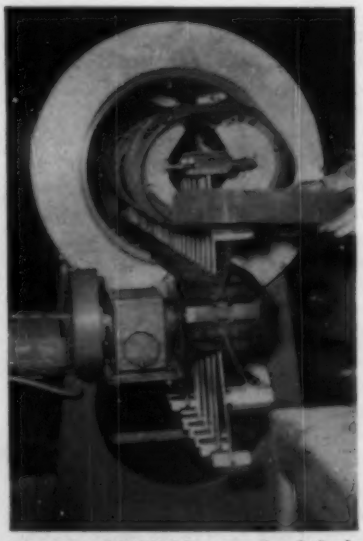
DIGESTED from Electrical World, Jan. 24, p196—Electrical applications in industry are as ingenious as they are numerous. Among the latest:

• **A manufacturer** of bonded brake lining has doubled output by installing a 13-kw. electric oven with radiant heaters. Bonding was formerly accomplished with a batch oven that presented a problem in controlling time of bonding and in handling parts into and out of the oven.

• **An induction heater** handles billets for extrusion more efficiently than the gas furnace formerly used at Revere Copper & Brass Co. Before, when the extruder was shut down unexpectedly, a load of heated billets was left in the gas furnace. To keep these hot or allow them to cool was costly. Each coil of the induction heater holds two billets, one heating and one preheating. In case of shutdown, a maximum of three heated billets are on hand.

• **A new type** of electric tunnel kiln cuts baking time of ceramic lamp bases 50%. Also, a higher degree of product uniformity is obtained through the improved distribution of heat in the new type of kiln. The 72-kw. tunnel kiln in continuous line production replaces a batch-type oven that was formerly used.

The new kiln is equipped with resistance-type heating units and has three zones—for preheating, glazing, and cooling. Versatility in temperature range permits glazing of various sizes and shapes that could not be handled in a periodic-type kiln.



BRAKE LININGS are bonded in 13-kw. electric radiant oven.

FINANCIAL DIGEST

More delays in new U.S. investments abroad, financial circles here claim, will stem from disagreements developing within the Administration. Proposed 14% tax reduction on income earned abroad is heading into a bitter fight between U.S. Treasury and State Departments.

Congress agreed last year to cut the tax rate from 52% to 38%. But controversy on wording of the bill held it up.

The point in dispute this year: What is foreign income? Should income earned from wholesale establishments abroad be included in the tax cut. Treasury says no.

So private investments abroad this year will not increase—may even drop by $100-million to a $1.2-billion total. Meanwhile, over 100 American firms delay their foreign investment plans.

✦ ✦ ✦

Mergers and rumors of mergers continue with little letup. Important U.S. firms are merging at the fantastic rate of about 50 a month. The value of companies merged since the war is roughly 10% of the net assets of all U.S. industrial companies.

What has caused this third great merger movement in U.S. history? Reasons are many. Companies merge to seek better positions for the period of hot competition they see ahead. They merge to keep pace with normal growth of the U.S. economy.

They merge to meet the demands of the changing American market or to smooth the ups and downs of seasonal or one-product operation. Or they merge to survive or to seek tax benefits.

Now intriguing the U.S. financial community are three proposed mergers: (1) Chase National Bank and the Bank of the Manhattan Co., (2) Bankers Trust Co. and Public National Bank, and (3) National City and First National Banks.

The foreign business of all the banks will be strengthened. Chase will be in a position to challenge National City Bank's leadership in that field.

✦ ✦ ✦

Corporate profits of U.S. companies will increase 12% this year over 1954. The result: dividend payments should increase by 10%. This follows an increase in '54 of 8% over '53.

But profits will vary sharply by industry—just as they did last year, when aircraft companies' nets ran 100% higher.

The next 5 years may see a 40 to 50% gain in dividends—to accompany a 20 to 25% greater gross national product. Look for biggest gains in chemical, oils, industrials. The result should be a 5½ to 6% yield on high-grade stocks at present prices.

✦ ✦ ✦

Stock markets, the world over, continue their dizzy paces. The U.S. is not alone in boasting of a lush bull market.

British, French, German and Italian markets have matched or out-paced the New York bull market. Belgium, Indian, Swiss markets are also up but lagging behind the U. S. pace. In Japan, prices have fallen steadily, with few optimistic of drastic change.

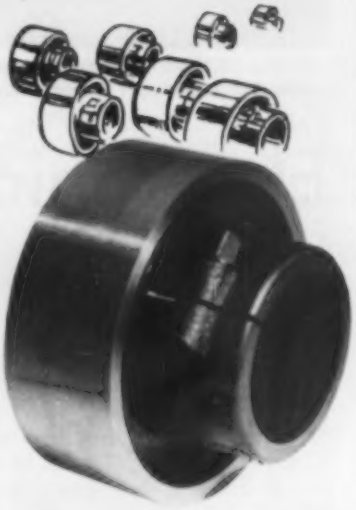
Competent analysts in London have turned cautious, believing that current prices have discounted higher future dividends. But Paris market observers feel that present prices are justified.

Nobody in Hamburg expects a real slump. Most observers in Milan are moderately optimistic; some expect a general decline. In Brussels, Zurich, and Bombay, prices are expected to stay firm.

This Digest, compiled from various sources, analyzes current financial trends and underlying factors.

DELORO STELLITE

SLITTERS LAST 8 TIMES LONGER



In high speed newsprint mills where steel slitters were formerly re-sharpened once a week, Deloro Stellite Paper Slitters now average two months between grinds. In low speed mills the increased life is even greater . . . lasting as long as three years between grinds.

In addition steel top knives, working against the smoother, Deloro Stellite bottom bands, last from 2 to 3 times longer . . . cut clean longer.

Write for your free copy of "Uses for Deloro Alloys in Pulp and Paper."

Specialists in Super-Alloys

Deloro Smelting and Refining Company Limited Deloro, Canada

AND

DELORO STELLITE LTD.

Shirley • Birmingham • England

Agents throughout the world.

INFRA-RED SPECTROMETER by Perkin-Elmer does quantitative analysis. It may control chemical processes.

CONTROLLER in Westinghouse range regulates heating. Thermistor senses pan temperature, informs controller.

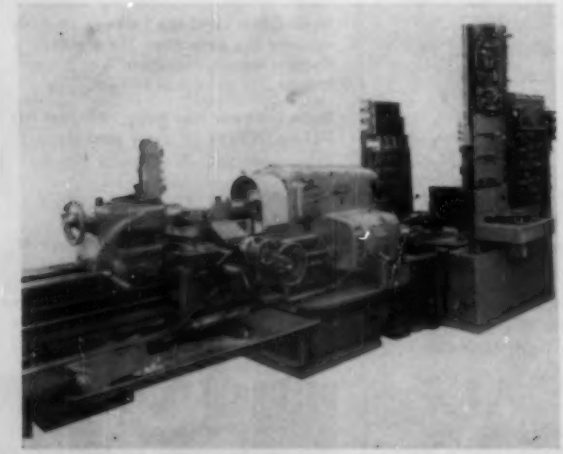
Electronics Place in Control

DIGESTED from Control Engineering, Feb, p41—The trend today in control applications, except where high power output is required or in hazardous locations, is toward electronic and electrical control systems. Here's why:

- A wide variety of transducers are now available that will give an electrical signal as a direct function of the measured variable—without intermediate mechanical converting elements.
- Electronic devices are inherently sensitive.
- Electronic devices are flexible. They offer all types of operational and computing functions.
- Environmental conditions do not affect properly installed wiring. Cold climates or moist atmospheres will not interfere with system operation.
- Inherent smallness and miniaturization trends permit complicated control systems to be efficiently packaged.
- Electronic control systems easily tie in with leased-line and microwave telemetering systems.

Reliability has been one problem with electronic equipment. But with the development of reliable types of tubes, magnetic amplifiers, and transistors and with reliable circuitry, this problem is being overcome.

Modern packaging techniques, such as plug-in construction and potting, and new methods of circuit assembly, such as printed circuitry and Tinkertoy construction (McG-H Digest, Dec '53, p38), are increasing the industrial acceptance of electronic controls. Tubeless amplifiers, either magnetic or combination transistor-magnetic, are also breaking down the barriers.

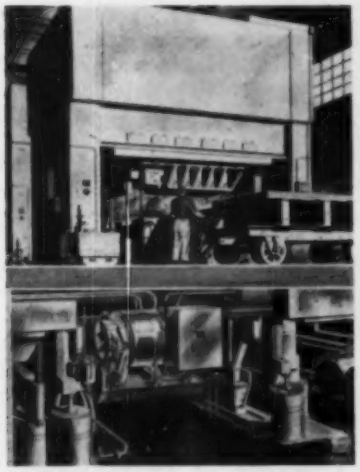


RECORD-PLAYBACK (General Electric) runs lathe. Manual lathe operation is recorded, then played back.

MICROWAVE and multiplexed-telephone channel telemetering monitor and control remote pipe-line pumps.

MACHINE by American Machine and Foundry controls cigarette quality.

DATA REDUCTION CENTER handles data from aircraft, missiles, and components. Leeds and Northrup data-handling equipment speeds design work.



METAL PRESS obtains fast response with forced-torque speed control.

CONTROL ROOM for power generating station includes boiler control panel and turbine-generator control panel. GE Amplidyne controls exciter output.

GYROPILOT is one of aircraft's indicating, actuating and control units.

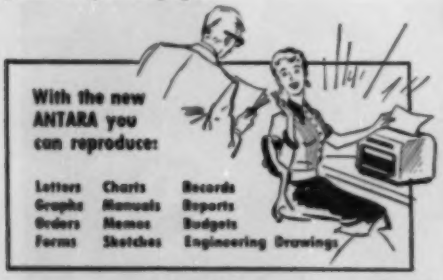
TANDEM COLD-STRIP MILL is controlled by Westinghouse magnetic amplifier units. Tensiometers tell operators strip-tension condition.

For low-cost, high-speed COPYING the new, compact

ANTARA

Easy! Convenient! Now, with the new small ANTARA Bambino, you can produce clean, dry copies of anything typed, ruled, written or drawn on translucent paper. Copies of letters, graphs and drawings that you need are instantly available! The new desk-model ANTARA takes no more room than a typewriter yet produces big-machine volume: 200 copies per hour! The cost per copy is only a fraction of the price you pay for your daily newspaper.

Also for industrial use: the large desk-top model, the ANTARA **O-36** . . . copies up to 16" wide (40 cm.) . . . or the upright model, the ANTARA **Streamliner** . . . copies up to 42" wide (106 cm.).



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Plan Trains Executives for Future Top Jobs

Digested from Factory Management & Maintenance, Feb, p94—Management training is not taken lightly at Westinghouse Electric Corp. It's a big operation. From 11,000 management people Westinghouse picks 925 men for executive development.

Men selected for training are placed in one of three reserve groups on the basis of careful analysis of formal appraisals and verification by both staff and operating management. The three groups break down this way:

1. **Executives** (125). These form the principal reserve for policy-making and profit-center positions—the top 250 posts. These men are shifted from one job to another to diversify experience.

2. **Middle management men** (250 to 300). These back up the 500 to 600 jobs just below the top 250 positions.

3. **Men with potential** for top jobs (500). These are kept under constant surveillance for transfer into No. 2 group.

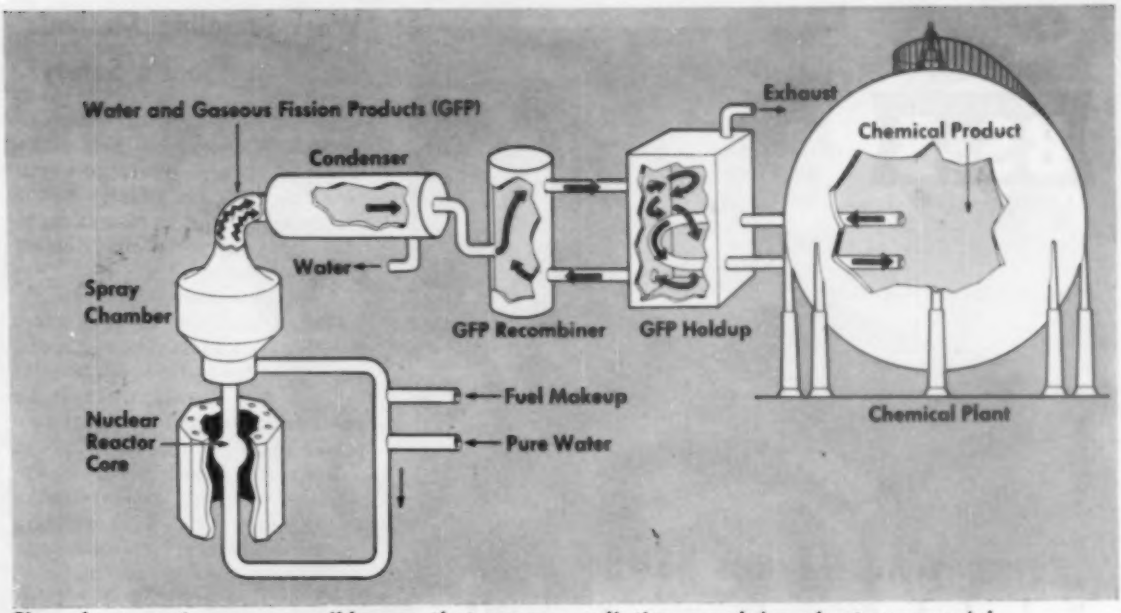
Training includes a 16-month course leading to a master's degree in business administration or industrial management, courses in business management, advanced management course, and a Westinghouse policy course.

Truckers in 14 Nations

Digested from Fleet Owner, Feb, p53—A survey of the living and working conditions of truck drivers in 14 nations—following a similar survey 5 years ago—shows that, on the whole, conditions have improved considerably, if not spectacularly.

The same U.S. driver, who in 1950 reported an average weekly income of $73, is now making $120 per week. The West German driver has nearly doubled his income (from about $18 per week in 1950 to $34 in 1955).

Out of the several interviews comes a prevailing feeling that the years between 1950 and 1955 were more difficult than the next 5 years will be, and that there are, on almost all counts, firm grounds for optimism.



Flow chart previews one possible way that gamma radiation may bring about commercial . . .

Chemical Synthesis

No one is yet ready to take gamma-radiation synthesis into a production plant. But many of the leading chemical companies are getting ready

DIGESTED from Chemical Week, Jan 29, p48—Excitement throughout the chemical industry stems from radiation catalysis, largely neglected so far in favor of isotope tracers and atomic power. But firms are now organizing departments, building facilities to find work for gamma radiation in chemical synthesis. The latest is Diamond Alkali Co., following closely the announcement of Standard Oil Development Co.'s new radiation laboratory (McG-H Digest, Feb, p18).

These companies are entering virgin commercial territory. Spadework for their venture has already been done by Atomic Energy Commission's researchers, such as David Ballentine, who pilots Brookhaven National Laboratory's fission-products utilization project.

Ballentine is enthusiastic on polymerization by radiation. "Aside from radiation," he explains, "there's just no other way to bring about this type of reaction without using heat, pressure, or chemical catalysts. But gamma rays . . . introduce no foreign matter —a consideration, for example, where electrical properties of the end product must be controlled. And they can't be poisoned like conventional catalysts."

Data obtained in Brookhaven experiments reinforce Ballentine's beliefs.

- A radiations-formed polyvinylpyrollidone may be better for blood extender purposes than the commercially made polymer; gamma radiation gives precise control of molecular weight.
- In polymerization of acrylamide in the solid state, high molecular weight and rapid reaction weights were obtained below the melting point of the material.
- Previously unsynthesized polymers, such as polyperfluoropropylene, were formed by exposure of the monomers to radiation.

Gamma radiation may cause unusual chemical behavior. Some monomers irradiated at low temperatures (−180° C.) do not polymerize, but, when raised to room temperatures, they explode. At the present, gamma radiation is unpredictable; while polyethylene becomes crosslinked on irradiation, other polymers (methylmethacrylate) degrade.

How will gamma radiation be applied in future chemical processes? The most likely form of equipment will use a rapidly circulating liquid fuel, as in the flow chart (above) developed by Brookhaven's Bernard Manowitz.

Uranyl nitrate solution, in this projected process, would feed in at the fuel makeup and circulate around the reactor core where chain reaction of uranium-235 would take place. The fuel solution, now radioactive,would travel to a spray chamber that flashes off water and liberates gaseous fission products, mainly xenon and krypton. These "hot" gases would then irradiate the chemical circulating through the holdup chamber. They would then pass back into the recombiner to increase their radioactivity.

Where the major uses will be is anybody's guess. Production of polyethylene, solid-state polymerization, and such chain-reacting unit processes as halogenation, amination, oxidation, nitration, sulfonation are all possibilities. Others that will attract more attention from researchers are production of hydrazine via liquid ammonia, benzene from hexane, and caproic acid from cyclohexanone.

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Work-Sampling Method Improves Plant's Safety

Digested from Factory Management & Maintenance, Feb, p92—Three years ago, Monsanto Chemical Co. (Everett, Mass.) had a safety program in its 62-man materials-handling group that did not produce results.

A switch in June 1953 to a work-sampling program brought these results: (1) no lost-time accidents, (2) sub-major injuries off from 18 in 1952 to 3 in 1954, (3) first-aid cases cut more than half, (4) sustained employee interest in safety.

Monsanto picked seven hourly workers and five supervisors as safety observers, briefed them on work-sampling principles. It asked each observer to make at least one observation per hour every day for a month. Every observation was to cover each yard worker in view.

In a month (22 working days), the observers recorded 9,200 observations—over 6% of them revealed unsafe practices. It indicated that Monsanto could expect three bad accidents per month and at least one lost-time injury per year. There would be 765 manhours unsafe work in one month.

Monsanto told this to the workers. It shocked them into 100% cooperation with management. A 12-man committee meets regularly to study work-sampling methods and check safety-program progress.

Easier Amature Dipping

Digested from Electrical Construction and Maintenance, Feb, p120—It is possible to conserve insulating varnish and at the same time dip armatures of all sizes in a 26 × 42-in. tank. The secret lies in welding to the bottom of the tank a pipe flange for holding capped sleeves of various lengths.

With this attachment and with the tank supported on block or a trestle, the shaft of the armature goes into the capped pipe while the armature itself is completely submerged in a minimum of varnish. When larger armatures are to be dipped, the tank is drained and a longer capped pipe is fitted.

LUMBER In spite of its great load capacity, the Ross Carrier has amazing maneuverability for operations within restricted areas.

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AUTOMOBILE A leading U.S. manufacturer of auto frames uses Carriers to transport components between stations of their assembly line.

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In the time it takes a full crew to load a conventional truck, a Ross Carrier can frequently *complete* the delivery! The Ross Carrier loads itself in 5 seconds and starts at road speed. There is no waiting time for loading or unloading. At the destination, the Carrier deposits its load in 3 seconds and hustles back for the next. *Practically perpetual motion for this one-truck fleet!*

In a wide variety of industries, the Ross Carrier has revolutionized materials handling. Send for your copy of a free, illustrated booklet which contains twenty-one case histories of Carrier operations in steel, petroleum, lumber, metalworking, food. This booklet will help you recognize ways to improve your own handling efficiency with the Ross Carrier.

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PERSONAL DIGEST

Overweight can shorten your life. All doctors agree on that. Extra pounds put more work on your heart, more weight on your joints. They damage blood vessels, especially those in the heart. And they make a man more susceptible to many different diseases.

The time you lose can mean years. A 50-year-old U. S. male has a life expectancy of 20 more years. But if he's overweight, his chances of living the 20 years may be cut by a third.

Over-eating causes overweight—doctors agree on that too. Too much food with too many calories plus too little physical activity does the damage. But modern weight-control methods can take off the pounds successfully and without "starvation" diets.

The rules are simple. Following them may be harder. Eat a balanced diet—but limit your calorie intake to your energy needs.

Eat a good breakfast, including proteins (eggs, meats, milk). It keeps your blood-sugar level high, keeps you from getting hungry again quickly.

Nibble between meals. It dulls the appetite. But, at the next meal, skip as much as you nibbled. Small servings of food between meals helps limit over-all calorie intake.

Don't over-exercise. Mild exercise helps burn pounds. But too much makes you hungrier. Too much vigorous work or play over the weekend makes you eat more on Monday.

✦ ✦ ✦

It's nearly vacation time again. And again too many executives will find too little time to take long enough vacations.

The American Management Association, in a survey of corporate policies and practices, found that 15% of the companies reported that management personnel took vacations that are too short. Many executives, one firm complained, "hang on to the breaking point."

How long should a vacation be? Not less than a week—two are much better as it takes most men a week to relax. The second week then gives the man the full benefits of the vacation, helps him "recharge" his nervous system.

✦ ✦ ✦

Pencils have now turned liquid. If you like ballpoint pens, you'll like the new pencils.

Parker Pen Co. broke the news first, announced at a big press party in New York City and in consumer-magazine advertisements its Liquid Lead pencil. Scripto, Inc., came next with its Fluidlead ballpoint pencil. Other manufacturers are reported ready.

You'll write with the ballpoint pencil the same as you write with a ballpoint pen. The fluid will make a pencil-like mark that can be erased. Scripto claims its Fluidlead will not deteriorate or separate in storage as graphite suspensions may do.

✦ ✦ ✦

If you're left-handed, you'll appreciate what a New York bank is doing for its depositors—offering a left-handed checkbook. Checks are at the left, stubs at the right.

The 10% of the people who are left-handed have long lived in a right-handed world. But life is getting easier for them.

They can now get left-handed golf clubs, violins, saxophones, trumpets, scissors, and even tablet-arm-chair desks, which for so long tortured the left-handed writer.

This Digest has been compiled from American Business, Business Week, Factory Management & Maintenance, and other sources.

Promotes Safety

Digested from American Business, Jan, p41—Training program at Pittsburgh Works of Allis-Chalmers Mfg. Co. promotes safe working methods and habits. Part of this program is instruction in manual artificial respiration equipment. Head nurse (above) explains operation of artificial respiration instruments.. The training program assures maximum protection for employees as elaborate systems of safeguards make it almost impossible to contact electrically energized equipment.

New Manganese Process

Digested from Chemical Engineering, Feb, p104—A U. S. Bureau of Mines process for refining manganese from low-grade ore is about ready for commercial use. It is now in pilot-plant stage.

The technique, called the dithionate process, leaches manganese dioxide ore with sulfur dioxide to form manganese sulfate. The sulfate reacts with calcium dithionate to form manganese dithionate.

At the same time, sulfate is removed as insoluble calcium sulfate. Adding lime precipitates the manganese as hydrated hydroxide and also regenerates the calcium dithionate. The manganese hydroxide is sintered to a mixture of oxides.

Earlier European attempts with the process required excess sulfur dioxide for rapid leaching. The Bureau process, with counter-current flow, needs much less—only 2 lb. per lb. of manganese extracted. Final product contains 60% manganese.

Vacuum Forming Makes Large Plastic Parts

Digested from Modern Plastics, Feb, p94—Some 20 parts, the largest over 58 in. high and weighing more than 9 lb., are being vacuum-formed from sheets of extruded high-impact styrene alloy material for Deepfreeze Appliance Div.'s (Motor Products Corp.) 1955 freezers and freezer-refrigerators.

Shelf supports and dispensing-type package racks, with pronounced undercuts in the vacuum-formed parts, are integral features. They reduce the number of final-assembly operations and provide an easier-to-clean inner door panel.

An unusual forming technique involves "orphan" inserts placed in the mold prior to the forming operation. These inserts produce the desired undercuts, then separate from the mold when the part is removed. They remain in the piece and add to the strength of the finished part. This technique removes certain design limitations customarily associated with vacuum-forming.

Flat Television Tube Could Alter Industry

Digested from Electronics, Feb, p7—Electronics Div. of Willys Motors, Inc., has developed a flat television picture tube that may revolutionize the industry and greatly simplify aircraft instrumentation. It consists of a phosphor screen mounted between two glass plates. The entire unit is evacuated.

The electron beam is injected along a horizontal edge of the tube and flows in a field-free region along this edge, adjacent to a row of transverse deflection plates. By controlling voltages on these plates, the electron beam is bent at any place along the tube's edge.

The beam then flows vertically in a second field-free region between a series of transparent horizontal deflection plates and the electrically charged phosphor screen. Controlled voltages on the horizontal deflection plates deflects beam into the screen at any desired vertical level.

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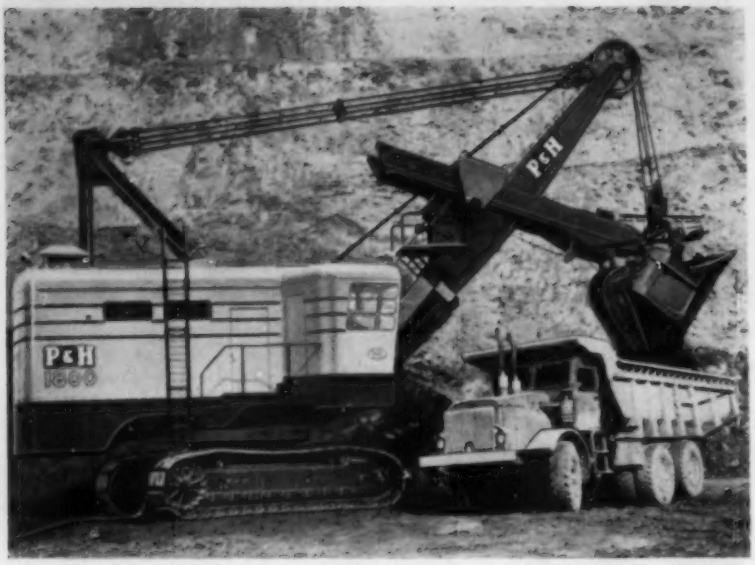

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Using grid control thyraton tubes, all operating motions are electronically controlled, resulting in finer performance characteristics . . . better co-ordination for the operator . . . more rapid response . . . up to 10% more production. Here are lower tonnage costs than ever before.

P&H Electronic Control is thoroughly proved, completely dependable. It achieves a new degree of simplicity. Electrical circuits and parts can be understood easily by any electrician.

Electronic control is now standard on all P&H Electric Shovels up to 10 cubic yards' capacity. Write for information. P&H Electric Shovels are manufactured by the Harnischfeger Corporation, Milwaukee, Wisconsin.

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Handball Holder

Digested from Electronics, Jan, p22— Complicated subassemblies for electronic equipment are held in working position by a fixture made from an ordinary handball. The ball is supported by a U-shaped piece of metal that is bolted to the worktable. A bolt and wingnut through the support permit adjustment.

New Trends in Metals

Digested from E&MJ Metal & Mineral Markets, Jan 20, p7—

▶ **Aluminum anchor chains** on minesweepers are being used by the Royal Canadian Navy. Aluminum has high strength and nonmagnetic properties. Chain has a tensile strength of 77,000 lb. per sq. in.

▶ **Tin and zinc plating solutions** in a common bath produce a rust-resistant coating that can be soldered and is inexpensive. The coating, developed by Sylvania Electric Products Laboratory, has the corrosion protection of zinc and the solderability of tin or cadmium.

▶ **Batteries** can now be printed on a plastic or paper card to power printed radio circuits. The "ink" contains a powder made of any magnetic metal such as iron, cobalt, nickel. After printing, the layer is put into a magnetic field that aligns the metal particles. Additional layers of metals are added and the finished layers are connected to yield a battery.

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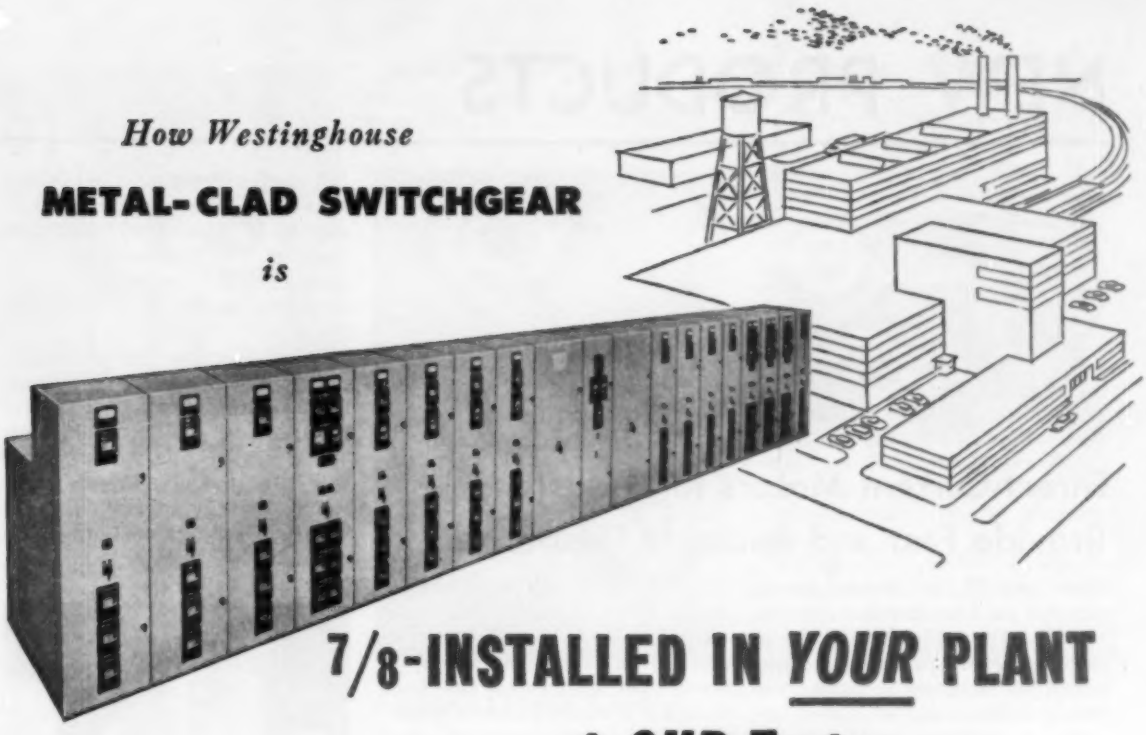

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Because Westinghouse Metal-Clad Switchgear is *standardized* switchgear—efficiently designed to meet all general industrial and electric utility requirements—you gain many other money-saving advantages. Planning and ordering costs are lower. Operation is simpler because all component parts are safely and conveniently accessible, and disconnects are combined physically with breaker elements. Maintenance time is reduced to a minimum. And you get more circuits in less space.

But these are only *some* of the reasons why Westinghouse Standardized Switchgear will fit *your* needs more economically. To get the whole story, write to me today, on your company letterhead, for a free copy of booklet BW-5306A.

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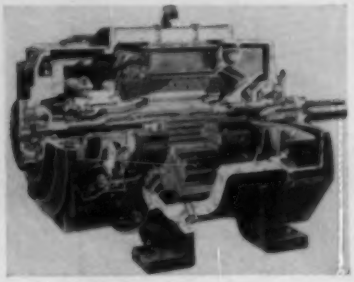
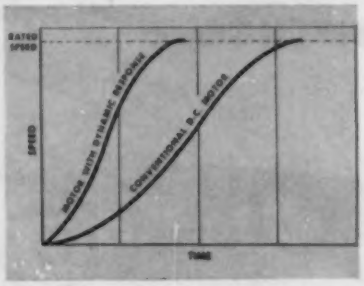




Direct-Current Motors for Industry Provide Fast and Accurate Response

New Super 'T' Line Motors (direct current) provide controlled reaction (see chart) to the demand for a change. These new motors produce a fast and accurate response in a standard design motor, and are reported to be twice as effective in many applications as any other motor now produced.

Here is an example of the manufacturer's concept of "Dynamic Response." A special 250-hp. drive in a steel mill operates a flying shear that cuts bar stock, traveling at 2,200 ft. per min. into 81-ft. lengths —within ¼-in. accuracy. The drive was a special design; for each cut, the motor is accelerated to a precise speed, stopped, and repositioned in 1.7 sec. Once requiring a highly-specialized design, this job now can be done with a standard Super 'T' Motor.

Super 'T' design features of ruggedness, ability to take full load and overloads, ability to change speed rapidly, ability to maintain torque and tension, and reverse and stop quickly are most significant. The motor's are expected to meet industry's growing demands for automation.

The time required for the Super 'T' to accelerate to full speed has been cut to half the time that was formerly required. Lower mechanical inertia, lower electrical inertia, and higher commutating ability have been combined to achieve this performance.

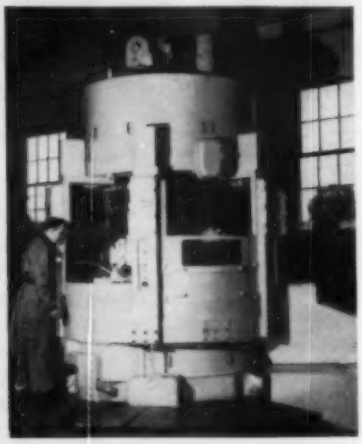
Super 'T' Line Motors are being produced in the sizes from 20 to 100 hp., and the range will be extended both upward and downward to higher and lower horsepowers. A complete range of mechanical enclosures has been developed to assure complete protection under every conceivable operating condition.—**Reliance Electric & Engrg. Co., 1088 Ivanhoe Rd., Cleveland 10, Ohio.**

Compressor Clutch Eases Cold Weather Starting

A new rotary air compressor employs a hydraulically-operated clutch that lets the engine warm up before the compressor is cut in. An interlocking control valve on the clutch allows the engine to warm the compressor oil and immediately lubricate the moving parts when this clutch is engaged, permitting easier cold-weather starting.

A cylinder arrangement with full gravity-draining of oil during shut-down prevents liquid from settling in cylinders, interstage chamber, or discharge point, thus preventing oil accumulation from damaging blades on cold-weather starts.

Other features include lightweight and compactness for economical transportation and easier handling on the job. The new "Blue Brute" rotary compressor will be available in 315-cu. ft. capacity with additional sizes to follow.—**Worthington Corp., Harrison, N. J.**



Vertical Chucking Machine for Low-Cost Production

Type L Mult-Au-Matic, a multi-spindle machine, has been designed for manufacture of component parts in automotive, aircraft, agricultural machinery, diesel engine, electrical and other industries. It is available in 10-in. size with 6, 8, 12 or 16 spindles. Models of 14 and 18 in. with 6 or 8 spindles will be available later.

The control system of the machine allows head setting and tool adjustment with little effort on the part of the operator. The feed mechanism is a new type. It has a stroke of 16 in. and offers more constant advance of cutting tools to the work than was previously available in cam-drum feed.—**Bullard Co., Bridgeport, Conn.**

Stand-Up Lift Truck

A new electric stand-up hydraulic lift truck is designed for operator efficiency and safety. Called the K-46 model, the truck is available in 2,000-, 3,000- and 4,000-lb. capacities. It has a top speed with a full load of 4½ to 5 mi. per hr., will carry the load up a 10% grade, and has a lifting speed with the full load of from 37 to 40 ft. per min.

Slightly under 28 in. in width, standard models are available in 68-in., 83-in. and 90-in. mast heights. The truck will turn a right angle in a 58-in. aisle and features 5° forward and 10° backward tilt. **—Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15, Pa.**

With a 1-cylinder, 2-cycle, 5-hp. economy engine, this balanced saw cuts through even the toughest timber up to 4½ ft. in dia. Full cutting power is maintained while slicing wet or frozen woods—Mall Tool Co., 7725 S. Chicago Ave., Chicago 19, Ill.

Features Touch Control

Personalized touch control is one of several new features on a Deluxe series of adding machines. The new adding machines add and print figures instantly as they are set up. This eliminates a motor bar for adding.

A mechanism permits three different ways of repeatedly adding or subtracting the same numbers, depending on the operator's skill and choice—a feature particularly useful for multiplication. Other features include the ability to add numbers without printing any figures except the answer, easy-to-read answer dials, and a switch control for single or double spacing.—**National Cash Register Co., Dayton 9, Ohio.**

Electric Bus Material

RABC (Reynolds Aluminum Bus Conductor) is a new material developed by Reynolds Metals Company to answer the need for an aluminum conductor to replace copper.

RABC, for which Reynolds claims improved mechanical properties, combined with high electrical conductivity, excellent workability, versatility as to size and shape, can replace copper in nearly every electric bus-conductor use.

Actual money savings are the primary advantage offered by RABC. Not only are fewer pounds of aluminum required for a given current-carrying capacity, but the cost of aluminum per pound is less than that of copper.—**Reynolds Metals Co., 19 East 47th Street, New York 17, N. Y.**

New Lightweight Saw

A powerful new lightweight chain saw has been designed especially for volume production cutting. The Mall model 3MG—an addition to the company's "MG" series—features advanced diaphragm carburetion and operates in any position. It fells, bucks, and limbs at extreme angles.

Pipelayer Has Improved Counterweight Design

New hydraulically-actuated counterweights, pivoting at the bottom, give No. 583 Pipelayer improved ground and side clearance. Counterweights are split on each side of the winch mechanism for improved balance and better steering. Counterweights retract over tracks, giving best equalized ground pressures and greatly reducing overall width for narrow right-of-way and for shipping.—Caterpillar Tractor Co., Peoria, Ill.

NOW

India

Has Biggest Cement Plant In Asia

Two Dorrco Type W Pumps installed for slurry handling.

INDIA is doing big things which will benefit the country and its people. And the new United Provinces Government Cement Factory, which was put into operation in 1954, is but one case in point.

The first closed-circuit grinding plant in India and the largest plant in Asia, it has a capacity of 3500 barrels a day. This output plays an important role in India's comprehensive dam building program for hydroelectric power and irrigation control.

The standard wet process flowsheet is employed using two Dorr Classifiers, eight Dorr Slurry Mixers and two 100′ dia. Dorr Thickeners. Wet materials handling is accomplished with three Dorrco Type W pumps and twelve A. C. Wilfley & Son pumps of various sizes. Dorr-Oliver, Ltd. of London supplied most of the equipment.

If you have a problem involving the separation of finely divided solids in suspension, the use of fluidizing techniques or ion-exchange, the chances are that Dorr-Oliver and its Associated Companies throughout the world can be of service to you.

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Improved Tractor Shovel

Tractor-shovel has bucket capacity of 1 cu. yd. heaped and ¾ cu. yd. struck load. Designated as the Model HFC, it is a rear-wheel-drive model and features a combination transmission and torque-converter drive.

Torque-converter cuts gear-shifting and "clutching", requires less concentration and effort on the part of the driver.

The special transmission is a full-reversing type, giving four speeds forward and four reverse up to 28 mph. All parts are interchangeable.—**Frank G. Hough Co., 923 Sunnyside Ave., Libertyville, Ill.**

Line of Torque Converters Fit Vehicles, Power Plants

A complete line of "Torcon" torque converters is suitable for heavy-duty, off-the-road vehicles as well as for stationary power plants used in construction, logging, petroleum, and other fields. Units are available in 11 to 19 in., and 26-in. wheels. Of the single-stage type, the Torcon line includes rated capacities from 30 to 600 hp.

The basic package consists of a standard, mass-produced, heavy-duty torque converter that is available "off the shelf" to engine and original equipment manufacturers, as well as to operators who want to up-date equipment. Basic accessories included with the unit are a pump, cooler, pressure regulator.

For installation in a particular line of equipment, the manufacturer will design and build the housing or case. It will include the means of coupling the output of the torque converter to the input of the equipment. Or a general-purpose case can also be provided that permits multiple means of torque transmission.—**Clark Equipment Co., Export Div., Battle Creek 73, Mich.**

NEW PRODUCT BRIEFS

Plastic Molding Machine—To permit molding of larger-size parts for plastic radio cabinets, toys, and housewares, a new 20- to 28-oz. injection machine has been designed. Designated as model 400-H-20, the new injection machine provides 60% more injection speed than the older 16-oz. model. It incorporates an automatic weigh feeder of compensating type as standard equipment.—**Hydraulic Press Mfg. Co., Mount Gilead, Ohio.**

Tarpaulins—Nylon and neoprene synthetic rubber are bonded together to make tarpaulins claimed to be far superior to duck tarpaulins. Life is three times longer, tear strength up to six times greater.—**E. I. du Pont de Nemours & Co., Wilmington, Del.**

Motor Grader—Increased horsepower is an improvement in new No. 12 Motor Grader. Power is now 115 hp. Clutch and transmission have increased capacity to match the greater horsepower. Convenient one-lever from-the-seat starting is now available. Accelerator-decelerator pedals permit changing speeds without changing the throttle setting.—**Caterpillar Tractor Co., Peoria, Ill.**

Low-cost Lithograph Plate—Presensitized aluminum lithograph plate sharply reduces the cost of duplicating halftones or other photo-offset copy. Plate saves labor costs and eliminates the need for an expensive investment in sensitizing and developing equipment.—**A. B. Dick Co., 5700 W. Touhy Ave., Chicago, Ill.**

High-output Generator — Especially designed for police cars, taxicabs, or other vehicles using two-way radio, the new generator has a maximum output of 50 amp. In cold weather, a maximum output of 60 amp. can be obtained by using a new Auto-Lite regulator with a temperature-compensated, current-limiting regulator unit. The generators are available with two sizes of pulleys, one for city operation and one for highway use.—**Electric Auto-Lite Co., 405 Lexington Ave., New York 17, N. Y.**

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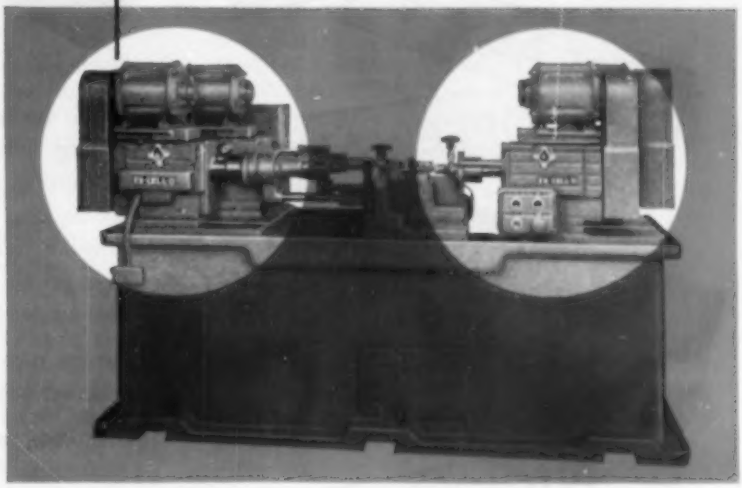

Four of Ex-Cell-O's famous quill-type Hydraulic Power Units drive the tools of the high-production machine shown above. This is one of many machines *built at very low cost* with Ex-Cell-O Power Units. All unit quills are advanced and can be retracted simultaneously from the central control station.

With one or more of these Ex-Cell-O Units, many kinds of modern automatic machines for drilling, reaming, counterboring, and spot-facing are now being built.

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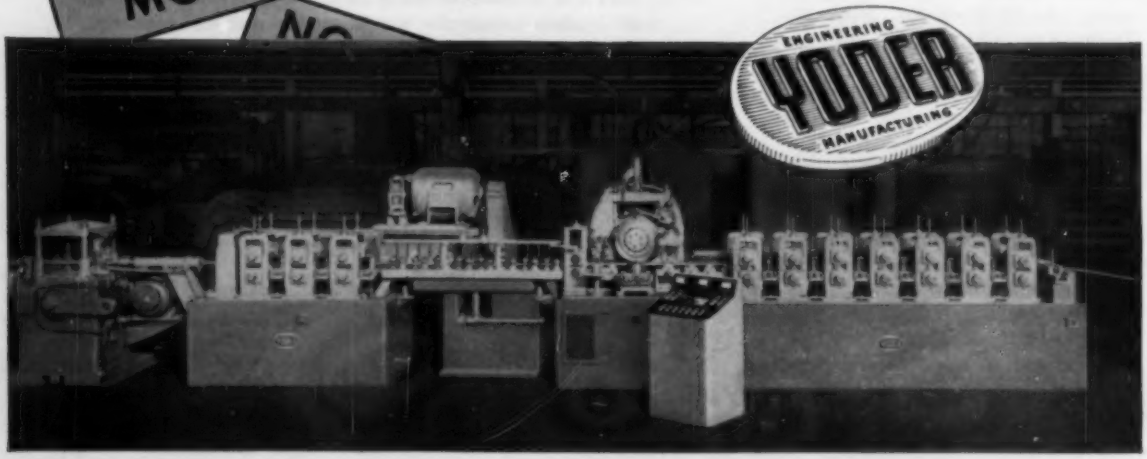

MANAGEMENT REPORT

If your company uses sales catalogs, you may want to compare your preparation and distribution methods with those of representative American companies. A survey of National Industrial Advertisers Association members shows that 91% of advertising departments but only 41% of sales departments participate in planning their catalogs. Most companies (44%) redesign their catalogs every 2 or 3 years, some (25%) every year, the same number (25%) every 4 to 5 years. Sales departments usually determine distribution, while one-quarter of the companies send catalogs on the basis of requests.

Do sales catalogs pay their way? Experience shows that they can reduce appreciably the cost per order. A large percentage of companies (41%) design their catalogs to elicit direct orders. 27% expect them to produce requests for further information, and 25% requests for salesmen to call.

When an employee makes a suggestion, or even when someone whispers of flying saucers, don't be too quick to say, "It's impossible." Here are some ideas that were "impossible."

- Anaximenes, 2,500 years ago, believed that moonlight was reflected sunlight. But the experts knew that all celestial bodies were fixed to a dome and shone by their own radiation.
- A Greek school about the same time proposed that matter was made of atoms with holes around and between. Absurd.
- Eratosthenes of Alexandria proposed about 200 B.C. that the earth was spherical and its circumference 24,000 miles.
- Copernicus, as late as 400 years ago, suggested that the earth rotated on its own axis while its center of gravity revolved about the sun. But everyone knew that it wasn't so.—Am Mach, Jan 31, p273

One of the best fringe benefits is fun. So believes top management at A. H. Robins Co. (Richmond, Va.) and attributes much of the firm's success to "company spirit." The employee-relations program includes occasional expense-paid holiday trips to New York City and Florida, impromptu beach parties and picnics, birthday cards with $25 checks to all employees, Easter hams, Thanksgiving turkeys, Christmas parties, year-end bonuses. The company can boast of one of the lowest labor turnover marks in the industry.—Chem Wk, Jan 29, p20

What do U. S. labor leaders think about automation? Control Engineering asked several important labor leaders for their comments. Here's what they thought:

Mine Workers (Independent). John L. Lewis says, ". . . I think anything that man can do to take slavery out of the daily toil of the human being is a contribution toward improvement of the race."

Auto Workers (CIO). Walter Reuther will insist on a substantial share of the benefits coming from increased productivity brought about by controls.

Office Workers (AFL). Paul R. Hutchings is "not too concerned about so-called labor-saving devices."

Paper Workers (CIO). H. D. Paley is not worried. But he is curious as to what happens to displaced workers: "We need a survey."

Oil Workers (CIO). O. A. Knight realizes automatic control is nothing new to his industry. He says, "It is inherently good to get more work done with less labor. This good can be translated into terms of greater abundance of goods for everyone . . . a generally higher and more comfortable standard of living."

Electrical Workers (CIO). James G. Carey sums up what appears to be labor's majority opinion: ". . . we think it is elementary that social and economic development must go hand in hand with technological development . . . our attitude should be to welcome these developments but insist that the benefits be distributed equally among the workers, the owners, and the public."—Control Eng, Feb, p25

Canadian International Trade Fair is scheduled for Toronto, Ontario, May 30 to June 10. It's North America's biggest annual trade fair. A cross-section of industrial and consumer goods from all over the world will be on exhibit.

Businessmen, too, from all over the world are expected to be on hand. They will be there to discuss problems, possible product modifications, prices, and deliveries.

Last November, the Fifth National Conference on Standards was held in New York. Proceedings of the conference have just been published. Here's an idea of the book's contents:

- The effect of international standards on world trade, especially in the electrical industry.
- Safety standards, their philosophy and how you can apply them to your business.
- Where standards should be applied.

The book also covers discussions on quality control, purchasing, architecture, company standardization, agriculture, color television, and the outlook for standards in the near future. The book, called Standards for a Strong America, may be obtained from the American Standards Association, 70 E. 45th Street, New York 17, N. Y. at $3.00 a copy.

NEW FREE CATALOGS

Milling Machines—Design highlights of styles 1A, 1B, and 1C Toolmaster milling machines are covered in bulletin M-1870.—Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

Port of New York—Booklets entitled "New York—The World's Greatest Port" and "Economic Development and Importance of the Port of New York" describe its services and facilities.—Trade Promotion Mgr., Port of New York Authority, 111 Eighth Ave., New York 11, N. Y.

Overhead Trolley Conveyor—Model X-228, the new Webb lightweight overhead trolley conveyor, is described and illustrated in bulletin 954.—Jervis B. Webb Co., 8951 Alpine Ave., Detroit 4, Mich.

Toggle Switches—Catalog 73a contains complete dimensions, operating characteristics, electrical ratings, and contact arrangements for 19 precision snap-action toggle assemblies.—Minneapolis-Honeywell Regulator Co., 2747 Fourth Ave. S., Minneapolis 8, Minn.

Hydraulic Presses—Catalog 289 contains detailed information on hydraulic presses for broaching, assembly, straightening, bending, and many other operations.—Dake Engine Co., Grand Haven, Mich.

Lumber Handling—Brochure entitled "More Board Feet Per Day" illustrates a few of the standard methods of conveyorizing your rough mill operations.—C. O. Porter Machinery Co., 666 Front Ave. N.W., Grand Rapids, Mich.

Bituminous Mix Plant—Construction and operational features of the Model 81 continuous mix bituminous plant are covered in bulletin 653.—Pioneer Engrg. Works Inc., 1515 Central Ave., Minneapolis 13, Minn.

Cellulose Gum—Technical booklet for the paper industry describes the properties of Hercules CMC for gloss-ink printing.—Hercules Powder Co., Wilmington, Dela.

Electric Hoists—The heavy-duty construction and operational features of a new line of electric hoists are described and illustrated in folder 618-9-4.—R. G. LeTourneau, Inc., 2411 South MacArthur, Longview, Texas.

Centrifugal Pumps—Bulletin 121 contains the design features and dimensions of Type SVS single-stage centrifugal pumps.—Pacific Pumps, Inc., Chanin Bldg., 122 East 42nd St., New York, N. Y.

Storage Tanks—Catalog 54B deals with storage tanks and steel-plate fabrication, features material specifications, tank design data, and foundation recommendations. — Hammond Iron Works, Warren, Pa.

Steam-trap Problems — Catalog 151 contains information on combination float and thermostatic traps that vent air in one-eighth the time of standard inverted bucket traps.—V. D. Anderson Co., 1935 West 96th St., Cleveland 2, Ohio.

Presses—Bulletin No. 46 contains recommendations for modernization and conversion of straight-side and gap-frame double-crank presses.—E. W. Bliss Co., 1375 Raff Rd. S.W., Canton, Ohio.

Primary Plasticizer—Bulletin 0-89 gives detailed information on Santicizer 141, an alkyl aryl phosphate nontoxic, primary plasticizer for polyvinyl chloride and its copolymers.—Monsanto Chemical Co., 1700 S. Second St., St. Louis 4, Mo.

Processing Machine—The Roto-Louvre, an effective dryer, cooler or dryer-cooler unit capable of processing large quantities of material with a uniform result, is described in book 2511.—Link Belt Co., 233 Broadway, New York 7, N. Y.

Diesel Engines—Pictorially illustrated, bulletin S-500-B13B gives available engine types, horse-power ratings, and plant auxiliaries, as well as the applications possible for the various types of diesel engines.—Worthington Corp., Harrison, N. J.

Industrial Trucks—The most important components of fork lift trucks are described in bulletin 64.—Baker-Raulang Co., 1250 W. 80th St., Cleveland, Ohio.

Heating Systems—Five major types of steam heating systems and a full line of valves, traps, and steam power specialties are described in bulletin 110.—Illinois Engrg. Co., Div. of American Air Filter Co., 2035 S. Racine Ave., Chicago 8, Ill.

Wood-working Tool—Form No. A-1003 describes the outstanding features of the model 126 Porta-Plane.—Porter-Cable Machine Co., South Haven, Mich.

Control Valves—Design details and operating characteristics of Foxboro's complete line of needle-type valves are described in bulletin 5C-13.—Foxboro Co., Foxboro, Mass.

Insulation—Booklet No. 37-D-2 tells how 85% magnesia insulation is produced, explains why it has high insulating value, and points out where it can be used to advantage.—Johns-Manville International Corp., 22 E. 40th St., New York 16, N. Y.

Air Conditioners—Bulletins 2005, 2006 and 77-5 contain detailed information on packaged and home air conditioners.—United States Air Conditioning Corp., 13 East 40th St., New York 16, N. Y.

Laboratory Microscopes—Uses, performance data, and specifications on more than 60 different microscope models and accessories and outlined in booklet D-185.—Bausch & Lomb Optical Co., 635 St. Paul St., Rochester 2, N. Y.

Turret Lathe—The many outstanding advantages of the new Bullard Cut Master Vertical Lathe, Model 75, are given in bulletin CM75-1.—Bullard Co., Bridgeport 2, Conn.

Expandable Polystyrene—A new foamable polystyrene is described in bulletin C-4-204. Applications include thermal insulation, toys, buoyant members, sandwich construction, and packaging.—Koppers Co. Inc., Koppers Bldg., Pittsburgh 19, Pa.

Machining Stainless Steel—Data and information to aid stainless-steel users in obtaining best results when machining Republic Enduro stainless steel is given in booklet ADV-607.—Republic Steel Corp., 485 Lexington Ave., New York 17, N. Y.

Rubber-lined Pumps—Rubber-lined pumps designed for handling fine-mesh abrasive materials are described in bulletin 52B8156.—Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Distribution Transformers—Bulletin GEA-6070 describes and illustrates the outstanding features of GE distribution transformers.—International General Electric Co., 570 Lexington Ave., New York 22, N. Y.

Please write directly . . .

. . . to the manufacturers for the free literature announced on this page. Tell them definitely which catalog you want—specify the catalog number or its name when either one is given. And mention that you saw the offer in the McGRAW-HILL DIGEST.

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Information Offered

If you need specific information on any subject, check through this index of literature and information being offered in the advertisements in this issue. Please write directly to the advertiser.

Agricultural chemicals for weed, brush and insect control. Diamond Alkali Co.—p1.

Coal-handling problems can be solved by push-button conveyor automation. Link-Belt Co.—p2.

Contour-matic band saws cut operating costs. DoAll Co.—p10.

Copper-tubing catalog will help to develop your tubing applications. Bundy Tubing Co.—p11.

Copying machine produces clean, dry copies of anything typed, ruled, written, or drawn. General Aniline & Film Corp.—p40.

Electronic equipment—marine radio-telephones, depth sounders, battery chargers, voltage stabilizers, tubes. Raytheon Mfg. Co.—p21.

Gravity conveyor system puts assembly, packing, and shipping on mass-production basis. Rapids-Standard Co.—p30.

Hydraulic power units drive the tools of high-production machines. Ex-Cell-O Corp.—p51.

Kardex visible ledger records cut posting and reference time more than 50%. Remington Rand Inc. —p24.

Materials-handling operations are speeded up by Ross Carriers. Clark Equipment Co.—p43.

Metal-clad switchgear is designed to meet all industrial and electric utility requirements. Westinghouse Elec. Intl. Co.—p47.

Oil filters have advanced engineering features and extra-high flow rates. Houdaille-Hershey of Indiana Inc.—p36.

Oilifts bring modern handling ease to countless lifting, loading, positioning, and materials-handling jobs. Globe Hoist Co. —p22.

Planning a plant can be a complicated process. Booklet tells the story of Ebasco and its services. Ebasco Services Inc.—p33.

Shaving machine shaves internal gears faster and to closer tolerances. National Broach & Machine Co.—4th Cover.

Steel—bars, plates, shapes, sheets, and other forms. Bethlehem Steel Export Corp.—p6.

Stellite paper slitters last longer . . . cut clean longer. Deloro Smelting & Refining Co.—p37.

Storage equipment for oil-field and agricultural production is efficient and reliable. Black, Sivalls & Bryson Inc.—p42.

Telephone cable of every type. International Standard Electric Corp.—2nd Cover.

Turbocharged diesel offers greater power at lower fuel cost. Waukesha Motor Co.—p32.

Welded tubes can be made faster, better, and at lower cost. Yoder Co.—p52.

ADVERTISERS IN THIS ISSUE

AIR EXPRESS INTERNATIONAL CORP.... 26
ALLGEMEINE ELEKTRICITATS-GESELLSCHAFT 5
ALLIS-CHALMERS MANUFACTURING CO., General Machinery Division..... 8
BETHLEHEM STEEL EXPORT CORP..... 6
BLACK, SIVALLS & BRYSON, INC..... 42
BUNDY TUBING COMPANY..... 11
BURROUGHS CORPORATION.....3rd Cover
CLARK EQUIPMENT COMPANY..... 43
DELORO SMELTING AND REFINING COMPANY, LTD..... 37
DIAMOND ALKALI COMPANY..... 1
DoALL COMPANY..... 10
DORR-OLIVER INCORPORATED..... 50
EBASCO SERVICES INCORPORATED..... 33
EX-CELL-O CORPORATION..... 51
FORD MOTOR COMPANY, LTD..... 25
GENERAL ANILINE & FILM CORP..... 40
GLOBE HOIST COMPANY..... 22
HARNISCHFEGER INTL. CORPORATION... 46
HITACHI, LTD..... 17
HOUDAILLE-HERSHEY OF INDIANA, INC. 36
INTERCONTINENTAL HOTELS CORP..... 4
INTERNATIONAL STANDARD ELECTRIC CORP..... 2nd Cover
KLOCKNER-HUMBOLDT-DEUTZ AG., KOLN 55
LINK-BELT COMPANY..... 2
MASCHINENBAU KIEL AKTIENGESELLSCHAFT 12
NATIONAL BROACH & MACHINE CO 4th Cover
NORDBERG MANUFACTURING CO..... 27
PIONEER RUBBER COMPANY..... 23
RAPIDS-STANDARD CO., INC..... 30
RAYTHEON MANUFACTURING CO..... 21
REMINGTON RAND INC..... 24
REO MOTORS, INC..... 31
SADOSHIMA METAL CO., LTD..... 28
SHAWINIGAN CHEMICALS LIMITED..... 45
VICTOR SAW WORKS, INC..... 29
WAUKESHA MOTOR CO..... 32
WESTINGHOUSE ELECTRIC INTL. CO..... 47
WILLYS-OVERLAND EXPORT CORP....28, 29
YODER COMPANY..... 52

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Publications Digested:

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←***Chooses Burroughs once again.*** Mr. Laursen, office manager of *Politiken*, is shown consulting with Mr. Knud Vohlert (right), the Burroughs man.

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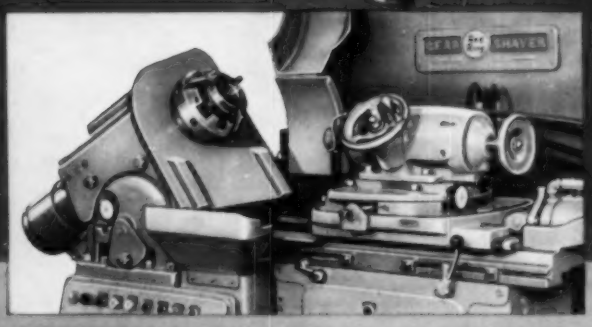

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